# UCC08EVAX3

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# UNIDAD DE PRECISION

## MANUAL DE USO

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CONFORTFRESH®
AIR CONDITIONING

# MANUAL DE INSTALACIÓN Y SERVICIO

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# INSTRUCCIONES A SU DISPOSICION

## ADVERTENCIA

Una manipulación, instalación o reparación incorrecta puede provocar daños al equipo, lesiones o incluso la muerte.

El mantenimiento y la reparación de este equipo deben estar a cargo solo de personal con capacitación especializada.

Lea todas las instrucciones de seguridad, instalación y operación.

## ADVERTENCIA

**Tensión peligrosa – Peligro de descarga eléctrica.**

Esta unidad contiene tensión muy peligrosa.

**La descarga eléctrica puede provocar lesiones o incluso la muerte.**

Desconecte todo el suministro eléctrico antes de trabajar en la unidad.

La unidad no está aislada eléctricamente aun estando apagada, algunos componentes internos requieren y reciben energía estando la unidad apagada.

**Para asegurar que NO haya tensión en la unidad, instale un desconectador e interruptor. Consulte los esquemas eléctricos de la unidad.**

## ADVERTENCIA

**Elementos bajo presión**

Esta unidad contiene fluidos o gases sometidos a alta presión.

Peligro de descarga explosiva al liberarse el refrigerante a alta presión.

**Libere la presión antes de trabajar con las tuberías.**

## ADVERTENCIA

**Peligro por piezas que funcionan a alta velocidad**

Algunas piezas de la unidad funcionan a alta velocidad y pueden provocar lesiones o incluso la muerte.

Desconecte todo el suministro eléctrico antes de trabajar en la unidad.

## ADVERTENCIA

**Superficies calientes**

**La superficie de algunos componentes internos puede calentarse y provocar quemaduras y lesiones.**

Use guantes con protección térmica cuando trabaje en la unidad.

## PRECAUCION

**Peligro de fugas de agua**

**Esta unidad requiere una conexión a un drenaje de agua. También precisa un suministro de agua externo para funcionar.**

Si se instala, o repara en forma inadecuada, puede producirse una fuga de agua en la unidad. Una fuga puede provocar daños graves a la propiedad y pérdida de los equipos críticos en el centro de datos.

**No coloque la unidad directamente sobre ningún equipo que pudiese sufrir daños por el agua.**

**CUIDADO**

**Durante el proceso de instalación y arranque siga con cuidado todas las instrucciones de panel de servicio. El no seguir estas instrucciones básicas puede ocasionar graves fallas o lesiones personales**.

# 1.- DESCRIPCIÓN GENERAL

Las unidades UCC de CONFORTFRESH están diseñadas para el acondicionamiento exacto del aire en ambientes de centros de cómputo o cuartos de equipo electrónico. El control electrónico es de alta precisión y regula el enfriamiento, la humidificación y el recalentamiento del aire que pasa a través de la unidad.

Otros componentes básicos de las unidades UCC son:

GABINETE: La estructura principal de las unidades más pequeñas está hecha en ángulo de acero de 1". Las unidades hasta el tamaño 190 están hechas en ángulo de acero 1 ½¨. Las unidades superiores al tamaño 190 usan ángulos de acero de 2¨. Todas las unidades tienen paneles fabricados en acero galvanizado recubiertos con pintura electrostática en polvo secada en horno color beige, para obtener una máxima protección contra la corrosión.

Todos los paneles están forrados internamente por una lámina de fibra de vidrio de 1" de espesor; esta fibra tiene un recubrimiento sintético que la protege de la corrosión del aire, es retárdate al fuego y ayuda a la disminución del ruido transmitido al cuarto.

El serpentín y las tuberías que generan condensación de agua están colocados sobre una bandeja de acero inoxidable para la recolección del agua de condensación.

COMPRENSORES. Todas las unidades UCC están integradas de compresores Scroll. En las unidades más grandes el compresor Scroll tiene protecciones internas contra cargas excesivas de corriente e igualmente todas las unidades tienen los motores protegidos externamente contra las cargas excesivas de corriente.

VENTILADORES CENTRÍFUGOS: Estos ventiladores están construidos en aletas de acero curvadas hacia adelante, con doble entrada y doble ancho; El Ventilador se entrega instalado y balanceado de fábrica con acople por transmisión directo. Los motores son monofásicos de 60Hz, 208-230 voltios. Las revoluciones del motor son 1050 para 60Hz.

La transmisión de poder está diseñada para girar los ventiladores a bajas revoluciones y manejar las cantidades de aire requeridas con un bajo nivel de ruido.

Las unidades se suministran con filtros de aire nominales con una eficiencia de 60-65% y 90-95%; filtros compacto, ligero y fácil de instalar, mini-pliegue de gran superficie filtrante de fibra de vidrio. Son de media y alta eficiencia con un espesor nominal de 4".

SERPENTINES. El serpentín evaporador se construye con tubería de cobre expandida mecánicamente para lograr una unión firme con las aletas de aluminio. El área del serpentín y la velocidad del aire están calculadas para obtener la mayor capacidad latente y sensible del aire.

La operación del compresor depende de la señal de temperatura o humedad que se ajuste para la operación del sistema.

HUMIDIFICADOR. Las unidades de UCC tienen un humidificador de vapor que descarga vapor de agua normalizado. El vapor es vapor de agua puro a 100°C. Cuando el humidificador descarga el vapor en el aire, se establece una mezcla aire/vapor. En esta mezcla, la temperatura del vapor disminuye rápidamente hasta la temperatura del aire.

Este dispositivo de humidificación compuesto de un recipiente con agua y un electrodo sumergido, controlados por un circuito electrónico que regula la potencia del electrodo y la dosificación de vapor.

RESISTENCIAS DE RECALENTAMIENTO. Estas resistencias están construidas para operar en dos etapas con el fin de subir la temperatura del aire frío a la salida del evaporador.

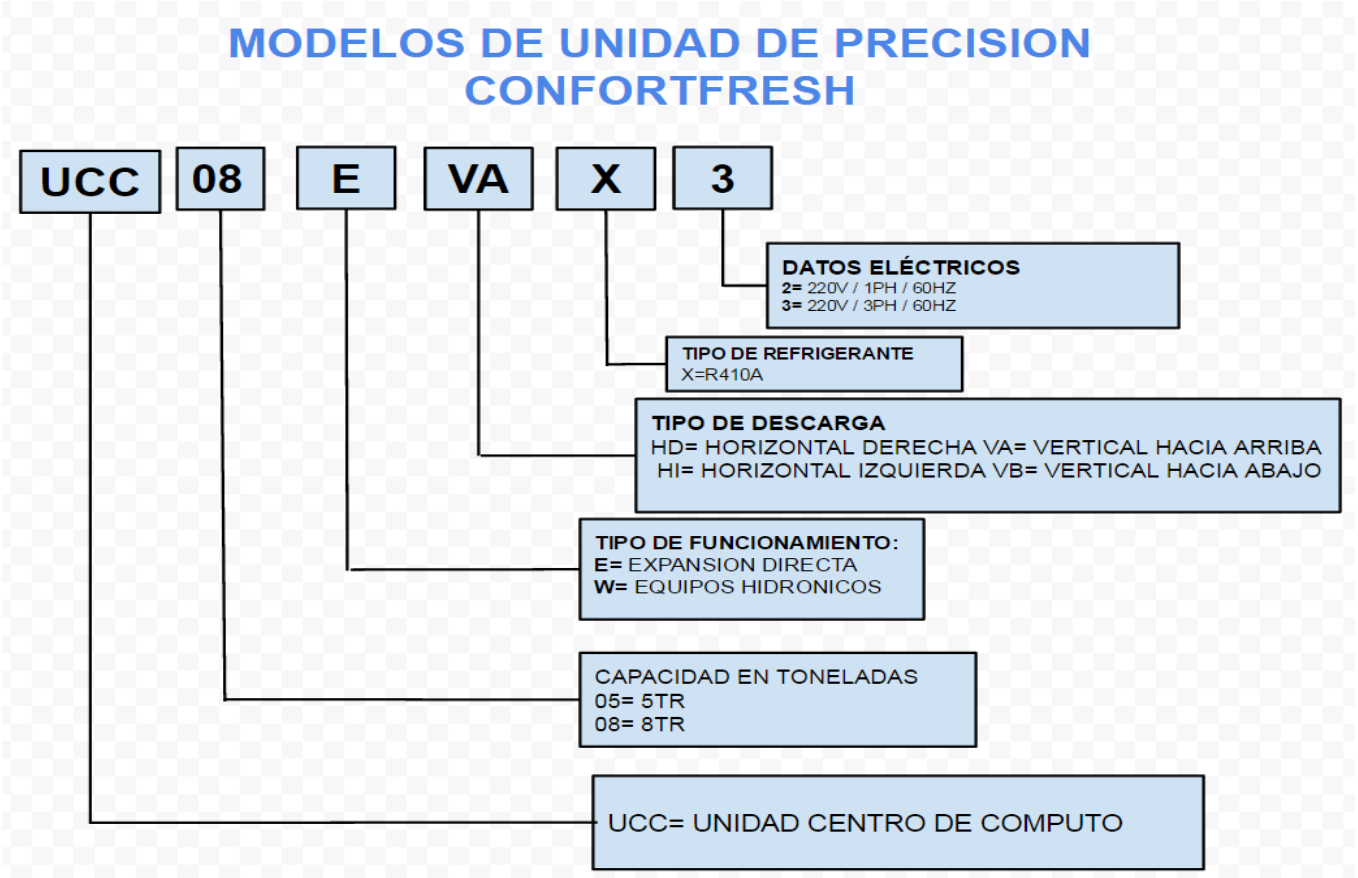
CONTROLES ELECTRICOS. Los UCC son unidades bien equipadas; tienen interruptores de corriente, contactores, monitores de fase, relevos, térmicos, sensores de presión, temperatura y humedad, que permiten un control y supervisión total a través del control digital electrónico, que es el cerebro de la operación del equipo.

El control digital electrónico también suministrará las siguientes alarmas:

Alta temperatura del ambiente
· Filtros sucios
· Baja presión de refrigerante
· Alto amperaje de motor de ventiladores
· Alto amperaje en los compresores
· Flujo de aire
· Alta presión de refrigerante

CONDENSADOR REMOTO. Las unidades UCC se suministran con un condensador remoto de descarga vertical (XXX). Cada condensador remoto como mínimo tiene un circuito de refrigeración que debe ser conectado respectivamente al compresor de la unidad interior UCC.

## 2.- NOMENCLATURA



# 3.- LIMITES DE OPERACIÓN

Las unidades UCC tienen unos límites de operación con respecto al voltaje, humedad y temperatura de condensación, que se detallan en la tabla No. 1.

**TABLA No. 1**

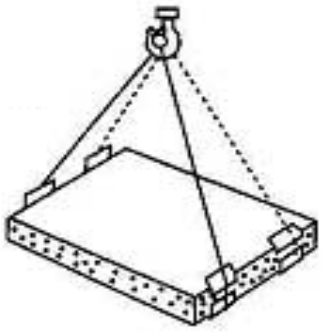
**LIMITES DE OPERACION**

| UCC | CARACTERISTICAS ELECTRICAS | | | TEMPERATURA ºC (ºF) | | RANGO DE CONTROL | |
|---|---|---|---|---|---|---|---|
| | VOLTAGE | | | AIRE ENTRANDO AL CONDENSDADOR REMOTO | | TEMPERATURA | HUMEDAD |
| | NOMINAL | RANGO | | MIN. | MAX. | | |
| **08** | 220/3/60 | 208 | 230 | 18.3 (65) | 40 (104) | ± 2ºC (18ºC – 25ºC) | 50% ±10% |

# 4.- TRANSPORTE

El equipo se encuentra soportado sobre una estiba de madera para sus desplazamientos a los sitios de instalación que será realizada a través de algún tipo de transporte. Para la ubicación del equipo en los sitios de obra deberá tenerse en cuenta el equipo necesario, desde un montacargas o una grúa de brazo escualizable para sitios altos.

En el caso de empelar cables para izar el equipo deberá protegerse el gabinete con madera para evitar que el cable dañe la superficie del equipo. Cuando el equipo sea izado deberá tenerse en cuenta que el centro de gravedad se encuentra desplazado hacia el compartimiento de los compresores que son los elementos más pesados.



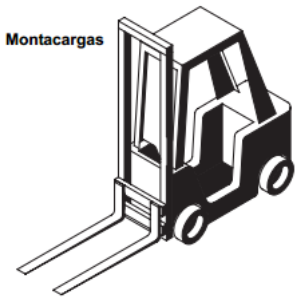
Una vez la unidad está en el lugar, es necesario quitar las estibas que sostienen el equipo y nivelar el equipo para su operación.

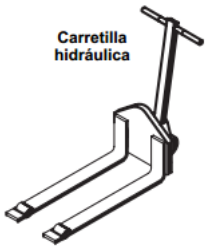
Las unidades UCC son despachas de fábrica presurizadas a un valor cercano de 200 PSI. Esto implica las precauciones correspondientes en su interconexión con el sistema de refrigeración externo. Al recibirse el equipo y al abrir los extremos de las tuberías de las válvulas de líquido y succión se revisará la presencia de presión la cual debe estar en el nivel indicado.

En caso de encontrarse índices de presiones bajas o nulas se verificará la posible existencia de fugas, que podrían haber sido ocasionadas por mal manejo del equipo durante su transporte, procediéndose a efectuar los reportes correspondientes al transportador y dependencias responsables en el despacho del equipo.

**PRECAUCION**

**Si la unidad tiene que ser desmontada para ser transportada a su lugar de operación, la garantía de la fábrica se anulará. Por favor avise para desarrollar las alternativas en este caso.**




**Equipo recomendado para el traslado de la unidad UCC**

- Si es posible, traslade la unidad con un montacargas, carretilla hidráulica, asegúrese que las horquillas (si son ajustables) estén separadas a la distancia necesaria y se ajuste a la plataforma.
- Ratifíquese de que la longitud de la horquilla sea la apropiada para la longitud de la unidad.
- Consulte la ubicación de los indicadores del centro de gravedad, cuando levante la unidad.

- Al Mover la unidad embalada, no eleve la unidad a una altura superior de 20” (508 mm) sobre del piso.

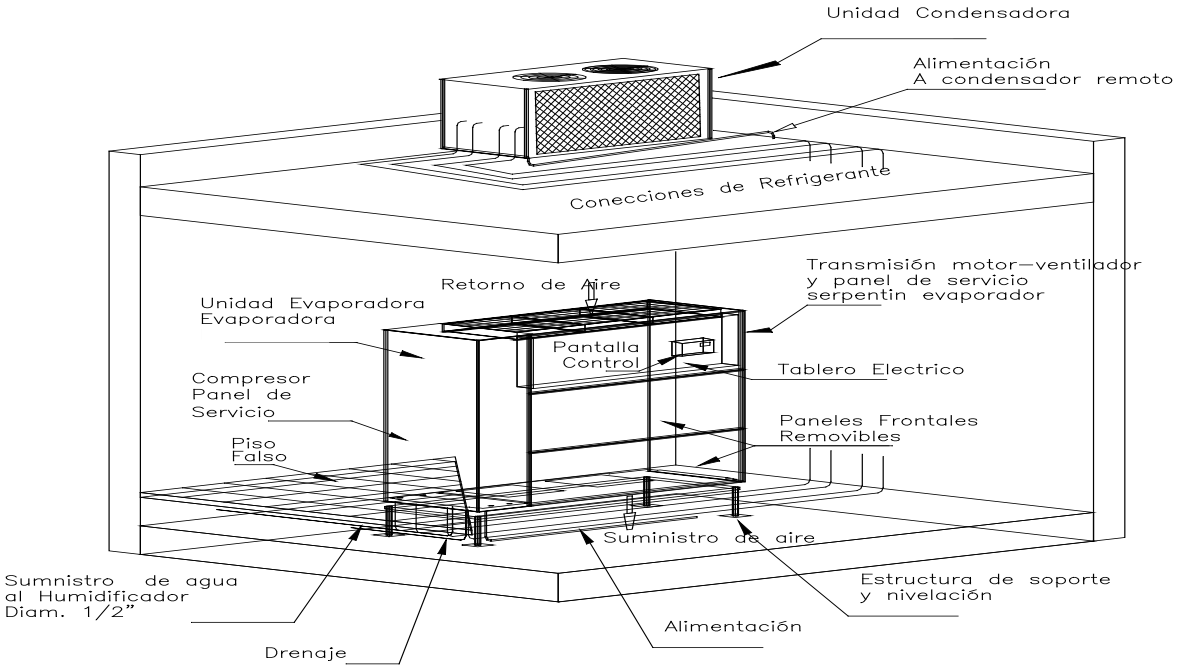
## 5.- UBICACIÓN

Para la unidad UCC, unidad interior, es importante conservar las distancias mínimas de servicio alrededor de la unidad que son las siguientes:

- Por el frente de los tableros principales debe haber mínimo 48” (1.20 mts.) libres de cualquier obstáculo;
- Por los costados debe haber un espacio mínimo de 24” (0,60 mts.) para inspección.
- Para facilitar el retorno del aire debe haber un mínimo de 16” (0.42 mts.) entre la parte superior del equipo y el techo.

Si se instalan dos o más unidades para el funcionamiento simultáneo dentro del mismo espacio acondicionado, deben distribuirse alrededor del cuarto para el buen suministro y retorno del aire en toda el área.

**INSTALACIÓN**



## 6.- CONDESADOR REMOTO

La fábrica entregara un equipo estándar con una unidad UCC; con un(os) circuito(s) de refrigeración, ventilador(es) centrífugo(s) de descarga superior y condensador remoto de descarga vertical (CA).

El condensador remoto tiene dos circuitos de refrigeración y ventiladores axiales de descarga vertical; está diseñado para operar en el exterior y se debe tener en cuenta para su ubicación un sitio con buena circulación de aire y buen espacio para evitar las molestias ocasionadas por el ruido producido por los ventiladores.

## 7.- TUBERIAS

Todas las conexiones de las líneas de refrigeración de la unidad son de cobre con soldadura, las conexiones de las líneas de fluidos son de PVC sanitarias, las tuberías instaladas en el sitio deben realizarse de acuerdo con las reglamentaciones locales y deben ensamblarse, probarse, separarse y aislarse correctamente.

Evite extender las tuberías por áreas en las que el ruido podría ocasionar incomodidad, como paredes de oficinas.

**Para obtener información sobre tuberías específicas de la unidad, consulte la documentación detallada en este manual.**

**PRECAUCION**

**Peligro de fugas de agua**

Esta unidad requiere una conexión a un drenaje de agua. También precisa un suministro de agua externo para funcionar.

Si se instala, o repara en forma inadecuada, puede producirse una fuga de agua en la unidad. Una fuga puede provocar daños graves a la propiedad y pérdida de los equipos críticos en el centro de datos.

**No coloque la unidad directamente sobre ningún equipo que pudiese sufrir daños por el agua.**

**PRECAUCION**

**Tubería de drenaje**

No reduzca los drenajes.

**No exponga los drenajes a temperaturas muy bajas.**

**El drenaje puede contener agua hirviente. Use tubería adecuada.**

El drenaje debe cumplir con todas las reglamentaciones de la edificación.

**El drenaje debe contar con un sifón fuera de la unidad.**

Instale el drenaje con una pendiente mínima de 1/8” (3.2mm) por cada pie de tramo de la tubería.

El drenaje debe tener la dimensión adecuada para un caudal de 2 gpm.

**ADVERTENCIA**

**Tubería de refrigeración**

Esta unidad contiene fluidos o gases sometidos a alta presión.

Riesgo de descarga explosiva debido a que el refrigerante se encuentra a alta presión.

Libere la presión antes de trabajar con las tuberías.

**Las unidades interiores se distribuyen con una carga transitoria de nitrógeno, no purgue el evaporador hasta que todas las tuberías de refrigeración estén en su lugar, listas para conectarse a la unidad al condensador**.

**Use tuberías de cobre tipo k instaladas, con soldadura fuerte de alta temperatura.**

**Aislé las tuberías de los sistemas del edificio usando soportes anti vibratorios.**

**Si precisa instalar el condensador a más de 15 pies (4.57 mts) debajo del evaporador, consulte a la fábrica.**

**Si la extensión de las tuberías es superior a los 100 pies (30.48 mts) de longitud, consulte a la fábrica.**

**TABLA No. 2. Tamaños recomendados para las líneas de refrigerantes – cobre, diámetro exterior en pulgadas.**

| MODELO | UCC08 | | CPV-RE | |
|---|---|---|---|---|
| | Descarga | Líquido | Descarga | Liquido |
| 50ft (15.24mts) | 1/2” | 1/2" | 1/2” | 1/2" |
| 100ft (30.48mts) | 5/8” | 5/8” | 5/8" | 5/8” |
| | | | | |

## 8.- CONEXIONES ELÉCTRICAS

Todos los modelos requieren suministro eléctrico trifásico. El suministro eléctrico debe cumplir con todas las reglamentaciones sobre electricidad local y nacional. Consulte la placa del fabricante del equipo con respecto al tamaño de los cables y los requisitos de protección del circuito. Consulte el esquema de electricidad cuando realice las conexiones.

Debe instalarse un desconectador manual de acuerdo con las reglamentaciones locales y el sistema de distribución. Consulte las reglamentaciones locales sobre requisitos de desconexión externa.

### ADVERTENCIA

**Peligro de descarga**

Algunos circuitos de esta unidad contienen tensión muy peligrosa.
La descarga eléctrica puede provocar lesiones o incluso la muerte.
Desconecte todo suministro eléctrico local y remoto antes de trabajar en la unidad.

### ADVERTENCIA

La instalación y el servicio de este equipo deben estar a cargo solo del personal que cuente con la capacitación especializada en instalación de equipos de aire acondicionado.
Una manipulación o instalación incorrecta puede provocar daños al equipo, lesiones o incluso la muerte.

### ADVERTENCIA

Use voltímetro para asegurarse de que se ha cortado el suministro eléctrico antes de realizar cualquier conexión eléctrica.

### PRECAUCION

La energía eléctrica trifásica debe estar conectada a los terminales de la bornera de tensión de línea de la unidad en la secuencia adecuada de modo que el(los) compresor(es) SCROLL(´s) giren en la dirección correspondiente.

### PRECAUCION

Consulte la etiqueta del transformador para realizar la conexión de la derivación principal. Si la tensión que se le aplicara a la unidad es distinta de la tensión de la derivación principal precableada, el instalador deberá cambiar la desviación principal del transformador.

### PRECAUCION

Utilice solo cable de cobre. Asegúrese que todas las conexiones estén firmes.

# 9.- MONITOR DE VOLTAJE

El monitor de voltaje instalado en la UCC protege los motores de cambios en las fases o variaciones en el voltaje de alimentación del equipo. El dispositivo supervisa el voltaje de la línea, el desequilibrio de las fases y temporiza el arranque una vez ha ocurrido una falla.

Para ampliar la información sobre la operación del monitor de fase, se debe referir al catálogo del fabricante de este equipo el cual se entrega, con los manuales del equipo.

# 10.- PROCEDIMIENTO DE CONTROL PARA INSTALACION

## Traslado y ubicación del equipo

- Desembalaje el material recibido.
- Verifique que la distancia alrededor del equipo sea la adecuada para las tareas de servicio.
- Revise que el equipo este nivelado y sus sujetadores de montaje estén consistentes.
- Si la unidad se desmonta, debe volverse a ensamblar de acuerdo con las instrucciones.

## Electricidad

- La alimentación y las fases del suministro corresponden con las indicaciones de la placa del fabricante.
- Las conexiones eléctricas deben estar completas entre, la unidad del evaporador y equipo para rechazo de calor.
- Los interruptores y/o fusibles de la línea de alimentación deben tener los rangos adecuados para los equipos instalados.
- Verificación de las conexiones eléctricas internas y externas de los equipos estén firmes.
- Comprobación de una adecuada puesta a tierra a la(s) unidad(es).
- Control de que el parámetro del transformador coincida con la energía requerida.
- Verificación del giro correcto de los compresores SCROLL´S.

## Tuberías

- Verificar instalación completa de las tuberías del circuito de refrigeración.
- Realizar verificación de fugas, purgas y carga de las tuberías.
- Las tuberías son de la dimensión adecuada, se extendieron con la pendiente adecuada, están presentes los sifones necesarios.
- Verificación de soportes adecuados a las tuberías internas y externas del equipo.
- Conexión e instalación del drenaje apropiado.
- Línea de suministro de agua conectado al humidificador oportunamente.

## Otros

- filtros instalados.

# 11.- CONTROL ELECTRONICO

## 11.1.- DESCRIPCION GENERAL

El panel electrónico es un microprocesador basado en el control de la temperatura y la humedad con programación de puntos de ajuste y funciones de alarma

El panel esta específicamente diseñado para operar unidades de acondicionamiento de aire para cuartos de cómputo, que requieren un control exacto del enfriamiento, el calentamiento, la humidificación, la des-humidificación y el recalentamiento del aire.

También supervisa los parámetros operacionales como las alta o baja presión del refrigerante, la perdida de presión a través de los filtros de aire, a su vez que genera mensajes de alarma por problemas internos del equipo.

## 11.2.- ARRANQUE INICIAL

**ADVERTENCIA**

Una manipulación, instalación o reparación incorrecta puede provocar daños al equipo, lesiones o incluso la muerte. El mantenimiento y la reparación de este equipo deben estar a cargo solo del personal capacitado.

**Lea y respete las advertencias de este manual.**

**ADVERTENCIA**

**Antes de proceder con el arranque inicial, asegúrese que la unidad este instalada con las instrucciones de este manual del usuario.**

Una vez finalizada la lista de procedimientos, se puede energizar el equipo para alimentar el tablero eléctrico de la unidad; esto permitirá activar el panel electrónico. Con el panel energizado se procede a verificar todos los puntos de ajuste del equipo, con la precaución de mantener todas las cargas de fuerza desactivadas.

Una vez se encuentra energizado el equipo la pantalla del controlador desplegará un aviso de espera mientras reconoce las entradas de señales que se hayan configurado; posteriormente despliega en pantalla la versión del sistema de control.

Finalizado este arranque el equipo está disponible para entrar en los diferentes menús de configuración del controlador, es importante tener en cuenta que el controlador presenta opciones que no aplican para el equipo ya que este control puede controlar otro tipo de equipos que requieren variables diferentes.

El control electrónico tiene un código de acceso que permite el ajuste de puntos de control y la modificación de los parámetros de fábrica, sin este permiso solo se puede hacer consultas simples de verificación de alarmas.

Para el ajuste de operación del equipo se debe tener en cuenta los rangos de configuración del equipo los cuales se detallan en la tabla No. 4

**TABLA No. 3 RANGOS DE AJUSTE**

| Ajuste | Descripción | Rango | Valor Configurado |
|---|---|---|---|
| 1 | Temperatura de zona | 17ºC a 29ºC | 21ºC |
| 2 | Banda muerta | 1ºC a 9ºC | 2ºC |
| 3 | Humedad de zona | 20 a 80% HR | 50% |
| 4 | Banda muerta | 1 a 30% HR | 5% |
| 5 | Alarma por Alta Temperatura | 2ºC a 35ºC | 27% |
| 6 | Alarma por Baja Temperatura | 2ºC a 35ºC | 16% |
| 7 | Alarma por Alta Humedad | 15 a 85% HR | 80% |
| 8 | Alarma por Baja Humedad | 15 a 85 HR | 40% |

## 11.3.-CICLO DE ENFRIAMIENTO

Cuando el control electrónico determina que el diferencial de temperatura entre el espació y el valor seleccionado es muy amplio, ordena arrancar los compresores para ajustar la temperatura; en la medida que se acerca al punto seleccionado apaga uno de los compresores por presión de succión, esto se logra al cerrar la válvula solenoide del circuito que impide la circulación de refrigerante en el circuito que se desea apagar.

El compresor finalmente se apaga porque el gas disponible en el serpentín evaporador se agota y se produce una baja presión que dispara el control de baja presión de la unidad.
Una vez se alcance la temperatura deseada el segundo compresor también se apagará por el proceso anteriormente descrito. Para garantizar la correcta operación del sistema se debe haber hecho un buen vació y una buena carga de refrigerante para cada circuito.

## 11.4.- REGULACIÓN DE LA HUMEDAD

La regulación de la humedad se logra por intermedio de la acción de varios componentes introducidos en la circulación del aire. En el controlador los ajustes se inician con la ventana de M_MANUF_CONF4 en la UNIDAD CONFIGURAT que está protegida por contraseña.

La deshumidificación puede llevarse a cabo y controlarse por las siguientes acciones:

- Cuando el compresor está operando y genera el cambio de la temperatura
- Por ajuste en el control de la banda entre frío y agua condensada
- A través de la reducción de la velocidad del ventilador

La deshumidificación sólo se habilita si la temperatura ambiente cae dentro de los límites de la alarma. Para los valores que exceden este valor la deshumidificación se inhibe.

La Humidificación depende del humidificador que en su control está integrado con el control electrónico del equipo y actúa en una lógica tipo ON/OFF como lo hace la deshumidificación. La diferencia está en elemento que este caso corresponde al cilindro con agua y la flauta que suministra la humedad al flujo de aire.

El UCC está equipado con un humidificador de electrodo sumergido que puede ser 3Kg/h, monofásico, con voltajes entre 220V.

Cada humidificador que se programa en el control electrónico según los siguientes parámetros:

CAPACIDAD NOMINAL: Es la capacidad de vapor nominal que entrega el cilindro es 3Kg/h.

VOLTAJE: Es el valor de voltaje de la fuente de alimentación, este varía desde 0 a 660V.
NUMERO DE FASES: Es el número de la fases de la fuente de alimentación. Es posible prefijar 1 o 3 fases (monofásico o trifásico).

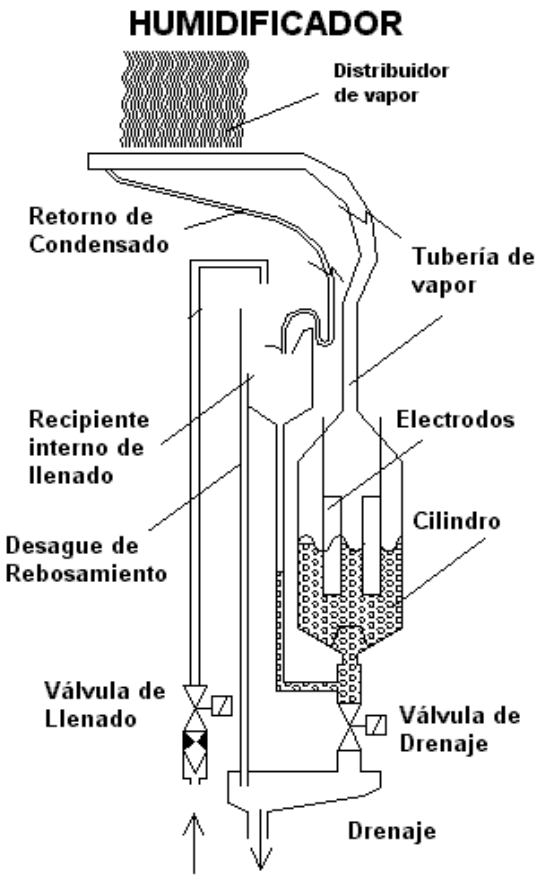
TAM MODEL: Se selecciona el modelo de transformador del electrodo que va a ser utilizado. Prefijando 0 = TAM 50, 1=TAM 100, 2=TAM 150, 3 = TAM 300, 4=TAM 500, 5=TAM 700,

Finalmente se debe establecer sin voltaje cuando queda habilitado o deshabilitado el desagüe de la unidad.

La capacidad de producción de vapor instantáneo del humidificador puede ser verificada por una opción directa en el menú del control. Además, se podrá supervisar algunos valores característicos como la conductibilidad, la corriente consumida por fase y los diferentes modos de operación de la unidad.

Para información adicional ver el manual del humidificador suministrado con el equipo.

**FIGURA No. 3 CICLO DE HUMIDIFICACION**



## 11.5.- RECALENTAMIENTO

Cuando el control detecta que la humedad del cuarto está por debajo del punto seleccionado el arranca un compresor para extraer humedad del aire del cuarto.

Sin embargo, durante este proceso la temperatura del cuarto podría empezar a bajar por debajo del punto seleccionado para esta variable debido a la falta de una carga de calor normal; esto se compensa prendiendo una o las dos fases del recalentamiento de la unidad.

## 12. AJUSTE DE CONTROLES

Durante la prueba de fábrica los controles de operación y seguridad se calibran según los parámetros de la tabla No. 5.

Es importante conservar el ajuste de los temporizadores de los compresores ya que evita el arranque simultáneo de los mismos, previendo ocasionar altos amperajes que hagan saltar la protección general de la unidad. También es muy importante verificar el punto de ajuste del monitor de fase para que pueda proteger la unidad eficazmente

Cada instalación podría requerir un ajuste diferente del monitor de fase y del control electrónico; se debe tener especial cuidado cuando se selecciona el punto de ajuste del monitor, ya que este no puede ser demasiado bajo o alto, porque la unidad operará sin una protección eficaz.

**TABLA No.4 PUNTOS DE AJUSTE**

| | | |
|---|---|---|
| Control de alta presión | (HP) | 350 PSIG |
| Control de baja presión | (LP) | 40 PSIG |
| Monitor de Voltaje | (VT) | |
| | Nominal Voltage | 220 Volt. |
| | Voltage Range | +/- 10% |
| | Phase Unbalance | 5% |
| | Start-Up Time Delay | 3 Min. |
| | Non-Critical Failures | |
| | Disconnect Time Delay | 15 Sec. |
| | Reset Mode | AUTO |
| | Control Mode | ON |

## 13. DATOS ELÉCTRICOS

La siguiente tabla proporciona parámetros eléctricos de cada componente y un amperaje máximo de operación del equipo para la selección del cable que debe traer el suministro eléctrico de la unidad. Se debe tener en cuenta los requisitos del código eléctrico local, porque puede haber recomendaciones diferentes a las sugeridas en la tabla No. 6.

**TABLA No. 5 CARACTERÍSTICAS ELÉCTRICAS**

| UCC | VOLTAGE | COMPRESOR (1) | | MOTOR EVAPOR (2). | HUMIDIF. (1) | CALENTADOR ALETAS (4) | MOTOR COND. (1) | M.C.A | M.C.A |
|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | RLA | FLA | FLA | FLA | UCC08 | CPV-RE13096XB3 |
| | | (amps) c/u | | (amps) | (amps) c/u | (amps) c/u | (amps) c/u | (amps) | (amps) |
| 08 | 220/3/60 | 26.0 | 190.0 | 7.6 | 10.0 | 15.91 | 5.2 | 114.84 | 6.5 |

## 14. MANTENIMIENTO

**ADVERTENCIA**

Una manipulación, instalación o reparación incorrecta puede provocar daños al equipo, lesiones o incluso la muerte.

El mantenimiento y la reparación de este equipo deben estar a cargo solo del personal capacitado.

Lea todas las instrucciones de seguridad, instalación y operación.

**Respete todas las advertencias que aparecen en este manual.**

La frecuencia de todas las actividades del mantenimiento preventivo se indica en la tabla No.8 por favor esté seguro conocer bien los procedimientos y tener disponible, las herramientas que se requieren antes de hacer cualquier trabajo en la unidad. Cualquier trabajo de reparación en el control electrónico podría necesitar de un técnico electrónico; la fábrica o su distribuidor de PARAMO local podrán proporcionar el soporte técnico necesario llevar a cabo cualquiera de las actividades listadas.

**TABLA No. 8. ACTIVIDADES DE ANTENIMIENTO**

| DESCRIPCION | DIARIA | SEMANAL | MENSUAL | SEMESTRAL | ANUAL |
|---|---|---|---|---|---|
| Verifique temperatura de operación y humedad | ● | | | | |
| Verifique nuevas alarmas en el panel de control | ● | | | | |
| Verifique presiones de operación | | ● | | | |
| Verifique los voltajes y amperajes de operación. | | ● | | | |
| Verifique en las mirillas de líquido la presencia de humedad en los circuitos | | ● | | | |
| Verifique señales de líquido retornando al compresor (condenación de agua en la carcasa del compresor) | | ● | | | |
| Limpie los serpentines del condensador remoto | | | ● | | |
| Limpie el serpentín evaporador | | | ● | | |
| Verifique los puntos de ajuste de los controles de presión | | | ● | | |
| Verifique la tensión de la correas y la alineación de la poleas | | | ● | | |
| Purgue el tanque del humidificador (Use el interruptor del desagüe manual proporcionado en el panel de control del humidificador) | | | ● | | |
| Verifique los puntos de ajuste de los controles de presión | | | ● | | |
| Verifique los puntos de ajuste en el controlador | | | ● | | |
| Borre las alarmas más viejas de la memoria | | | ● | | |
| Verifique el ajuste del soporte del ventilador | | | ● | | |
| Lubrique los rodamiento de las chumaceras en los ventiladores (si aplica) | | | | ● | |
| Aplique grasa a los ejes para evitar la corrosión | | | | ● | |
| Verifique el ajuste de las conexiones eléctricas de potencia | | | | ● | |

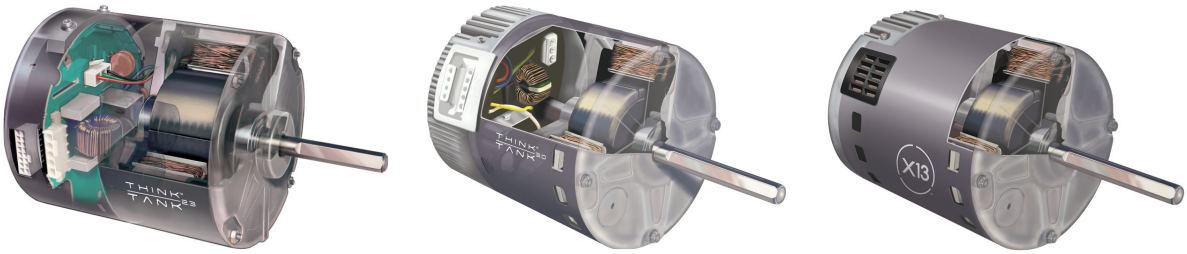
# 15.- MANUAL DE PARTES

# The ECM Textbook

## Table of Contents


- **Overview of ECM Technology**

- **Indoor Blower Motors**
  - **Variable Speed ECM**
  - **Constant Torque ECM**

**www.theDealerToolbox.com**

ecm | capacitors | blowers | motors

**About the Company**

When Regal Beloit acquired General Electric's Commercial and HVACR Motors and Capacitors businesses in 2004, it also acquired the rights to use the GE brand through 2009. With this rebranding, the Genteq logo will take the place of GE ECM, GE Commercial Motors and GE Capacitors logos on all branded products. For more information on the brand change please visit www.GenteqMotors.com.

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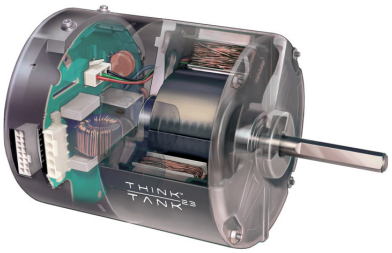
# Overview of ECM Technology

What is ECM technology? ECM (Electronically Commutated Motor) technology is based on a brushless DC permanent magnet design that is inherently more efficient than the shaded-pole and permanent-split-capacitor (PSC) motors commonly found in air handlers, furnaces, heat pumps, air conditioners and refrigeration applications throughout the HVACR industry. By combining electronic controls with brushless DC motors, ECM's can maintain efficiency across a wide range of operating speeds. Plus, the electronic controls make the ECM programmable, allowing for advanced characteristics that are impossible to create using conventional motor technologies.

Early HVAC literature listed these motors as **ICM (Integrated Control Module)**, meaning that a control was integrated or used in conjunction with a motor to control its operation. This was later changed to **ECM (Electronically Commutated Motor)** as they are typically referred to today. The definition of commutate is to reverse the direction of an electric current (the means by which all electric motors rotate). In an ECM this process is controlled electronically by a microprocessor and electronic controls, which provides the ability to increase or decrease the speed of the motor.

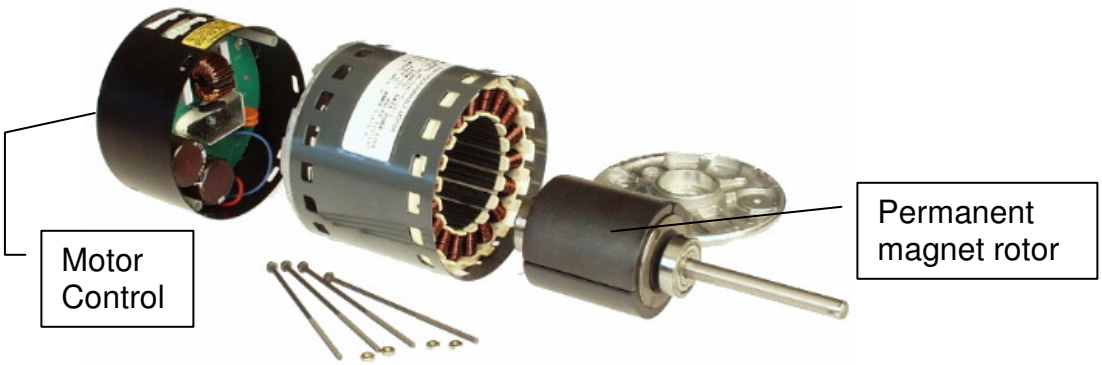


The Genteq™ motor, currently used by most residential HVAC systems is a brushless DC, three phase motor with a permanent magnet rotor. Motor phases are sequentially energized by the electronic control, powered from a single phase supply. These motors are actually made of two components, a motor control (control module) and a motor, sometimes called a motor module.

Motor Control (Control Module)

Motor (Motor Module)

*The motor control* is the brains of the device, where single phase (1Ø) 120 or 240 VAC 60 cycle (Hertz/frequency) power is connected. The control then converts AC power to DC power to operate the internal electronics, thus the name DC motor. The microprocessor in the motor control is programmed to then convert DC power (by means of electronic controls) to a three phase (3Ø) signal to drive the motor, thus the name three phase motor. It also has the ability to adjust the frequency (which controls the speed in revolutions per minute) and the level of current (power) it delivers to the motor.




*The motor* is essentially a three phase motor with a permanent magnet rotor. The permanent magnet rotor contributes to the electrical efficiency of the ECM and also to its sensor-less ability to control the rpm (revolutions per minute) and commutation (when to alternate the cycle). Typical DC motors require brushes to provide the commutation function. This is where the ECM motor gets the name brushless DC motor.

The benefit of all of this technology is increased electrical efficiency and the ability to program more precise operation of the motor, over a wide range of HVAC system performance needs, to enhance consumer comfort.

# Variable Speed ECM

The term **Variable Speed Motor** was coined back in the late 1980's when the first indoor blower ECM's were introduced to the residential HVAC industry (split systems and package systems 5 ton or less). By function they are also called **Constant Airflow Motors**. Both of these terms define the type or style of ECM it is programmed to function as.

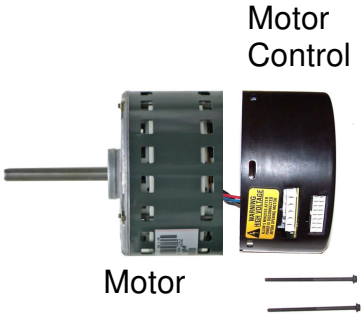
This motor was originally produced by three manufacturers, AO Smith, Emerson, and GE. Since the early 1990's most manufacturers have used the Genteq motor in their variable speed products. The brand name for this motor is the Think Tank™ which covers models ECM 2.0, 2.3, 2.5 and 3.0.

ECM 2.0

ECM 2.3/2.5

ECM 3.0

The three main benefits of this motor over conventional induction motors (PSC) include higher efficiency, more precise and unlimited airflow selection (variable speed), and properly maintained airflow during changes in system static pressure (constant airflow).



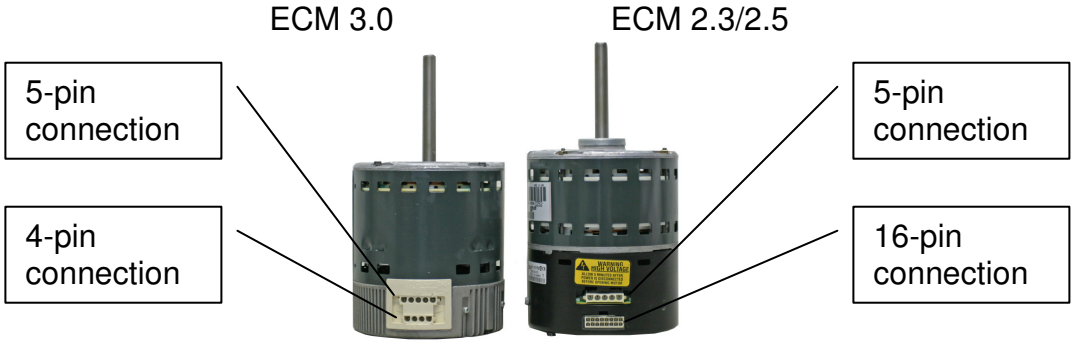

The Genteq variable speed is actually built as two separate components. The control module (motor control) is attached to the back of the motor module (motor). The variable speed motor control is programmed to provide constant airflow. This is accomplished by converting the desired CFM to a specific amount of speed (RPM) and torque (current) delivered to the motor.

Each HVAC OEM (Original Equipment Manufacturer) creates a special program unique to the model and size unit the variable speed ECM will be used in. This program provides multiple airflow and comfort options for each demand of the system the motor is installed in, and any of the possible connected components.

To summarize, the variable speed motor is operated by two programs. The HVAC OEM program determines what amount of airflow is needed by demand and the constant airflow program makes sure that selected amount of airflow is maintained even if external static pressure changes.

## Operation

The variable speed ECM is a dual voltage motor. The 120VAC or 240VAC single phase power is supplied through the 5-pin connector to the motor at all times, even if there is no demand for airflow. This power is what operates the internal electronics and drives the motor. The low voltage or serial communication that is sent to the motor from the HVAC OEM control board through the 16-pin connector (4-pin on latest model 3.0) is a combination of the HVAC OEM programming, the installer's selections of airflow and comfort settings and the current demand of the system (heat, cool, fan…). This is the information the motor control requires to determine how much torque and speed the motor will need for proper airflow of each system demand.




During each demand the motor control also monitors the actual speed in revolutions per minute (RPM) of the motor. There is only one combination of torque and speed that will create the proper amount of CFM demanded at a specific total external static pressure (ESP) of the system. If the speed/torque relationship is incorrect for the required airflow, the motor control can increase or decrease the torque (current) to the motor. This will in turn increase or decrease the speed of the motor to maintain airflow. By constantly monitoring the actual speed of the motor, and maintaining the torque/speed relationship programmed by the HVAC OEM, the motor control is able to maintain the airflow selection per demand if ESP changes.

Three very important points must be understood about this ability of the motor:

1. The motor will use more energy to maintain airflow when ESP is higher than the HVAC OEM recommended, and the air noise of the system may be increased.

2. The motor will use less energy to maintain airflow when ESP is equal to or less than the HVAC OEM recommendation and the air noise of the system will be decreased.

3. The motor has a programmed limit of operation to protect itself from damage, due to the energy (current) it must use to maintain airflow at high external static pressures. See the HVAC OEM literature for their recommended maximum total ESP. If the system exceeds this recommendation, airflow may not be maintained, however, the motor will still try to deliver as much air as possible, without causing damage to itself.

## Application

Variable speed motors are typically found in two-stage, multi-stage and modulating high end furnaces (80+% & 90+% AFUE), air handlers, package systems and also in geothermal systems.

## Benefits

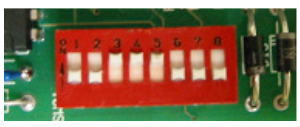
Constant airflow is the ability of the variable speed motor to maintain it's programmed and field selected airflow per demand, when ESP is higher than recommended and/or changes during system operation. ESP (the resistance to the movement of air) is increased when ductwork is undersized, poorly constructed and/or full or dirt or debris. ESP can increase during system operation when dirt builds up on the air distribution systems components, especially the filter, and when customers close or block grilles and registers. The variable speed motor is programmed to maintain airflow during all of these situations, within the limits of the HVAC OEM programming and motor design. On PSC induction motor systems, airflow will decrease when ESP increases.

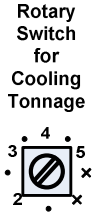
When set up correctly the benefits of the variable speed motor system include:

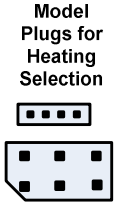
- Energy savings
- Improved outlet air temperature for each system demand
- Improved humidity control
- Improved system capacity
- Reduced space temperature swings
- Reduced air noise with soft start/stop and gradual changes between airflow demands, delays and/or profiles
- Reduced constant fan air noise with low CFM settings plus increased energy savings over normal system operation
- Reduced repairs associated with continuous low airflow operation

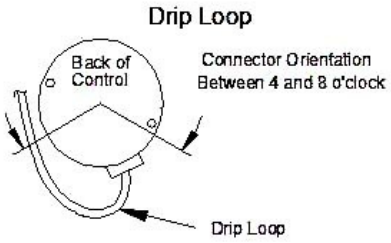
## Installation/Set-up

After the system is installed, the technician must follow the HVAC OEM manuals to set the proper airflow and comfort settings to match the components and operation desired as installed. These are typically selected by use of jumper pins, dip switches and/or multi-pin plugs on the HVAC OEM control board in the system. There are also systems in the marketplace that are able to adjust many of these selections at the user interface (in these systems, the user interface replaces the thermostat as a communication center for the system). If these selections are not set at the time of installation, there is a good chance the system will not perform as expected and/or not produce the designed capacity. In addition the system may be prone to problems and/or premature parts failures.








It is recommended that the electrical connections on the ECM face down or between the 4 and 8 o-clock positions, and a drip loop formed out of the wiring harness leaving the motor. This is to prevent any moisture or water that may get into the motor area from running into the connectors where it could cause damage to the control. In most systems, the HVAC OEM will install the motor in the correct position and provide the drip loop. However, when multi-position systems are installed in a position other than the manufactured position, the motor may need to be turned and the drip loop re-arranged.

The total external static pressure (ESP) of the installed system should be measured and compared to the HVAC OEM charts. If it is above the maximum listed for that unit, improvements should be made to lower it. Any total ESP below the maximum is typically acceptable. However, system efficiency, noise levels and potential service issues will all be improved when the total ESP is as close to the HVAC OEM recommendation as possible. HVAC OEM installation manuals provide guidelines that should be followed per unit for best performance. Some important examples of the guidelines found in these manuals include filter sizing charts, proper duct connections and unit cut-outs. On fossil fuel systems, the temperature rise should always be measured and corrected if not within the HVAC OEM rating on the data plate of that unit.

Note: Water damage is one of the most reoccurring failures with electrical components. Always construct and size the condensate drains and traps by the HVAC OEM specifications.

**Troubleshooting (Genteq variable speed motors only)**

Before troubleshooting any HVAC system, it's a good practice to become familiar with the components and wiring diagram, check for and follow any on board diagnostics (HVAC OEM system fault codes). On variable speed systems it's also a good practice to check the airflow, comfort and delay settings. The HVAC OEM manuals will typically be required for these settings and can also provide valuable sequence of operation and troubleshooting help.

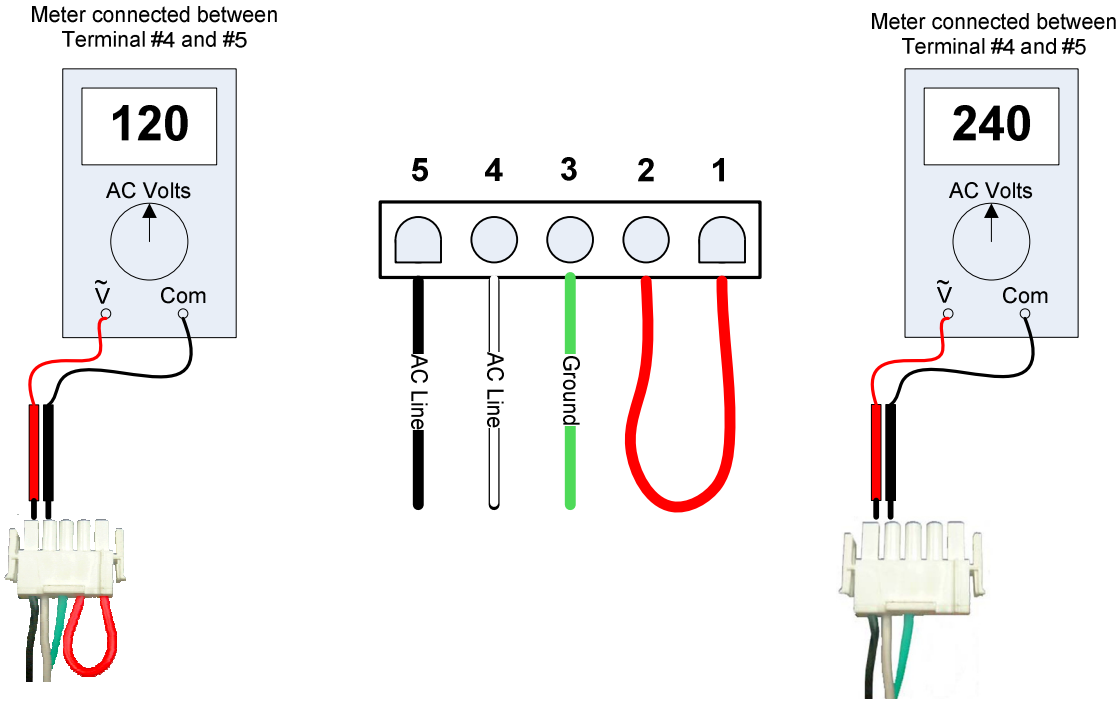
*If the motor is running* but the system is noisy, shutting down on its limits or safeties or the evaporator coil is freezing, there is a good chance the motor is good. The problem is most likely external to the motor.

- Check the airflow settings using the HVAC OEM guide
- Check the air distribution system components for dirt load and closed dampers, registers and grilles.
- Measure the total external static pressure and make repair(s) if above the HVAC OEM recommended maximum level. Aftermarket filter sizing is a common issue.

*If the motor is not running*, the following checks will diagnose whether it is operational. **Always disconnect the power to the HVAC system before disconnecting or reconnecting any connectors to these motors.** There are two inputs needed to operate this motor, a high voltage constant power source, and the communication that selects the airflow requirement per demand. All of the connectors/plugs used with this motor are keyed for proper orientation. If connected improperly the motor may not operate properly and/or be damaged.

- **Checking the high voltage input**

First check the high voltage to the 5-pin connector. There should be 120VAC or 240VAC depending on the system at terminals 4 and 5 whenever there is power to the system, regardless of a demand call. On 120VAC systems, make sure the polarity of the connected power to the motor is correct. If this voltage is missing, fix the problem in the system and try to run the motor. If the voltage is within ± 15% of these ratings then move on to the next step. If the voltage is above or below the ± 15% of these ratings, fix the voltage problem first, and try to run the motor. Proper grounding should always be checked and repaired if needed.




120VAC motors must have a jumper between terminals 1 and 2 for proper operation.

240VAC motors should not have a jumper between terminals 1 and 2 to prevent damage to the motor.

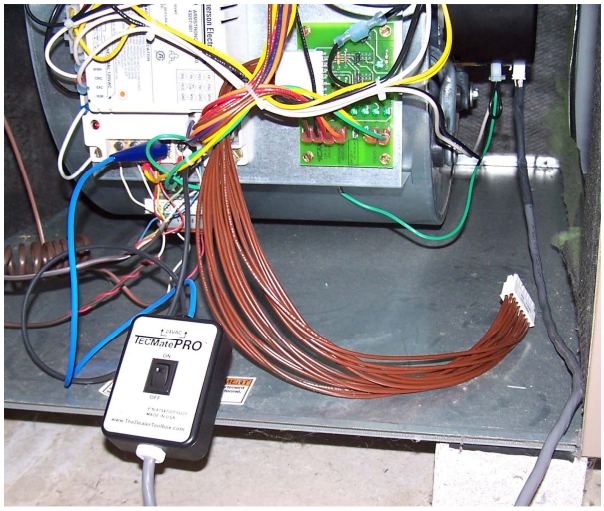
- **Checking the communication input**

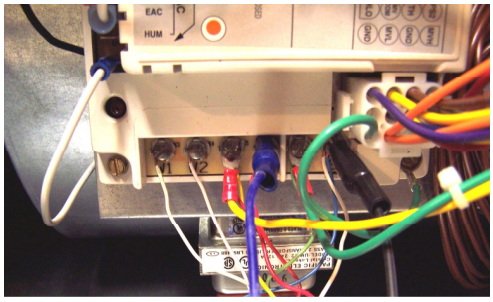
To check the communication to the motor on the 16-pin connector (4-pin connector on the latest model 3.0) you will need the systems OEM manual showing by pin what voltage/communication should be present per demand. This voltage could be AC, DC and/or serial communication. Some HVAC OEM's provide troubleshooting tools for use on their motors. Genteq also has a troubleshooting tool for this purpose that will work on all of their variable speed motors in all HVAC OEM systems (with the exception of the model 2.5 motor). This tool is called the TECMate PRO. This device will simulate a communication signal to the motor. The TECMate PRO is available at most distributors as well as our website www.theDealerToolbox.com.

Begin set-up with the TECMate PRO switch in the off position.

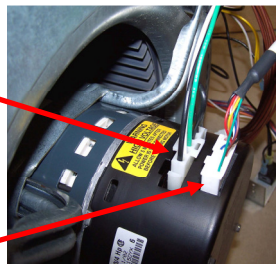
- The TECMate PRO has two wires with alligator clips for connection to a 24vac power supply (they are not polarity sensitive). The green led on the TECMate PRO will turn on when properly connected to 24vac. The 16-pin connector from the TECMate PRO is connected to the motor in place of the HVAC OEM 16-pin harness (4-pin connector on the latest model 3.0). The 5-pin high voltage connector must be connected to the motor with its power confirmed and the system power turned on (after all of these connections are completed) for this test.

If the motor runs when the TECMate PRO switch is turned on, the problem is before the motor in the HVAC system. If the motor does not run with the TECMate PRO, then the motor control is failed and will need to be replaced. The motor, however, may still be good.



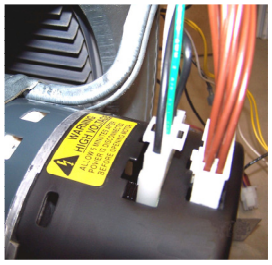



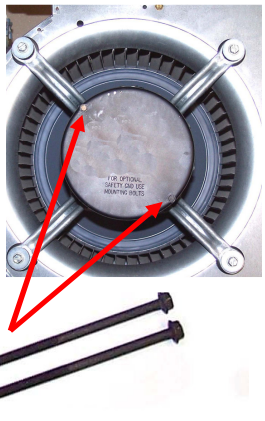

**5-pin Connector Re-installed**

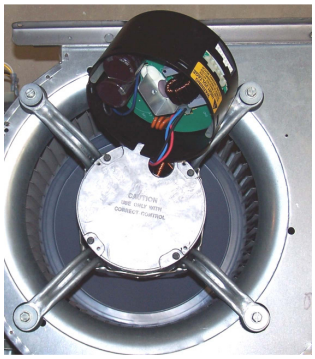


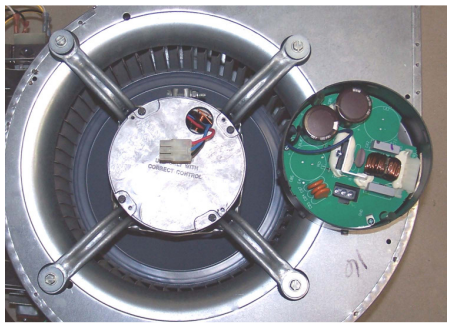
**TECMate 16-pin Connector**

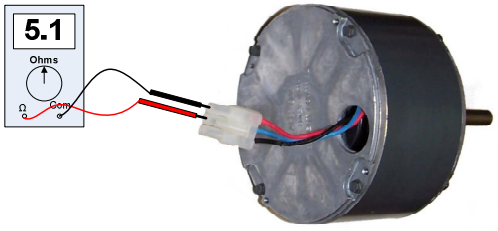
To check the motor separately from the motor control, turn off the main power and disconnect the high voltage 5-pin connector and the communication 16-pin connector (4-pin connector on the latest model 3.0). **There must be at least 5 minutes elapsed time between when the power was disconnected and the next step**. Remove the two ¼" hex head bolts from the end of the control module and carefully separate it from the motor module. Unplug the 3-pin connector between the control module and the motor.

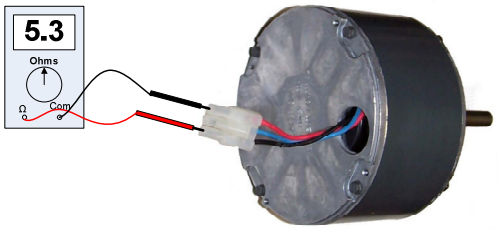


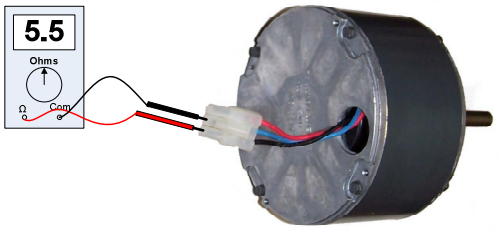






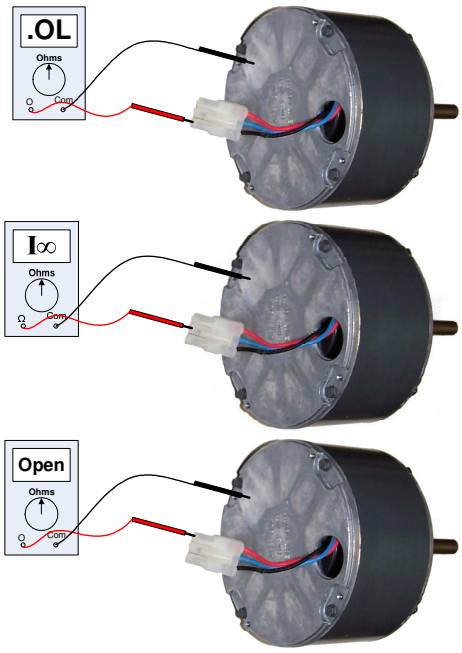


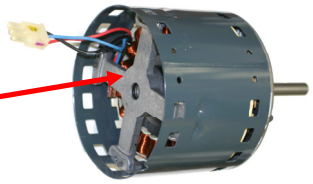

Perform the following ohm tests on the motor through the 3-pin connector.

- Ohm out the phases from one terminal to the other in the connector. Set the meter to the lowest ohms scale. If the readings are all less than 20 ohms and within ± 10% of each other, the motor passes this test. If not, the motor is failed and must be replaced.




- Ohm out the motor windings from each terminal in the connector to ground, the face of the motor (X-brace on the model 3.0). Set the meter to the highest ohms scale (no meg-ohm meters). If all of these readings are above 100,000 ohms, the motor is good. Typically a good motor will show all readings as Infinity (I), (O.L.), or (Open). If any of these readings is below 100,000 ohms, the motor is failed and must be replaced.

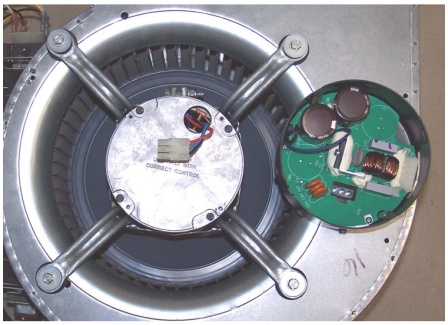
Model 3.0
X-Brace

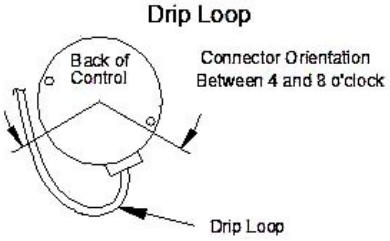


**Repair**

The variable speed ECM has a unique program for each HVAC OEM model and size unit it is used in. Replacement control modules and/or motor modules must be an exact match to the system they were removed from. There are no universal replacement controls or motors. Using the wrong parts voids all product warranties and may produce unexpected results. Always follow all instructions included with the replacement motor and/or control.

If only the motor control needs to be replaced (the motor passes both ohms tests), the motor can stay in its mount, in the blower section. The new control will install just as the old one was removed. If the entire motor must be replaced, (motor control and motor module) it's easier to install the motor fully assembled. Belly band mounting brackets should only make contact with the motor, not the motor control, and should not cover any motor vents. The connectors should be facing down when he blower section is in the system and the wires leaving the motor should be formed into a drip loop. If there is any sign of water damage on the old motor or control, correct the water issue.





The variable speed ECM may rock back and forth when it first turns on. This is normal operation for the control to figure out the proper direction to operate the motor.

Always check the wiring and proper operation of the entire system (including system safeguards) after all service and repair work.

**Conclusion**

The variable speed motor produced by Genteq ECM is currently in its 6th generation. Reliability improvements over these generations include:

- Fully encapsulated electronics to protect against moisture damage
- Improved EMI filter to provide protection against line transient (voltage spikes)
- Speed limiting to prevent over-current operation due to extremely high external static pressure operation
- Durable ball bearings on all models

With proper installation, set-up and annual system maintenance, these motors are providing proven reliability in today's high end HVAC systems.

The HVAC OEM has almost limitless ability to choose the amount of airflow, on/off delays, and comfort profiles for each demand of the system. It is imperative that the contractor consult installation and service manuals to set up the system properly and take advantage of all of its capabilities. Attending the HVAC OEM classes on variable speed products, as with all products, is also highly recommended.

# Constant Torque ECM

Genteq introduced the **Constant Torque** motor (model X13) to the residential HVAC industry (split systems and package systems 5 ton or less) in 2006.The term “Constant Torque” defines the type or style of ECM it is programmed to function as.

The X13 is constructed as one piece, with the two components of any ECM, the motor control and motor, housed inside one motor shell. It is programmed to provide a constant level of torque (current/power) to the motor. This is a multi-tap motor with the ability to have from 1 to 5 programmed levels of torque, similar to the speeds of a PSC induction motor. However, the torque value programmed into each tap is determined by the HVAC OEM (Original Equipment Manufacturer). Each value equals a specific amount of torque to create the proper amount of airflow for each system demand (heat, cool, constant fan). This value is also specific and unique to each HVAC OEM, model and size system.

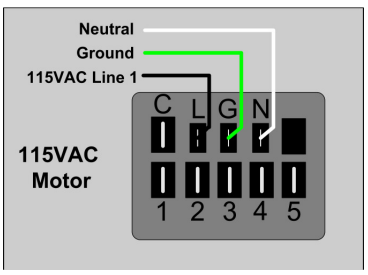
To summarize, the X13 motor is operated by two programs. The HVAC OEM programmed torque value determines what amount of torque is needed by demand and the constant torque programming makes sure that selected amount of torque is maintained even if external static pressure (ESP) changes.

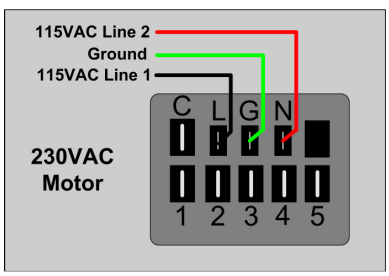
The three main benefits of this motor over conventional induction motors (PSC) include higher efficiency, more precise airflow, and properly maintained torque during changes in the systems external static pressure (constant torque).

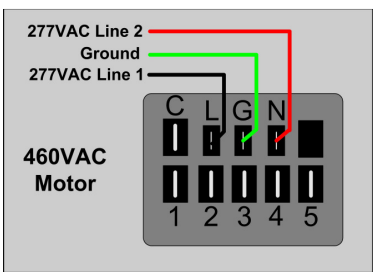
**Operation**

The X13 motor is available in three models, 115VAC, 230VAC and 460VAC (Introduced in 2009). The high voltage connections to the motor are the same regardless of which voltage model is used. Those terminals are labeled (L), (G), and (N).

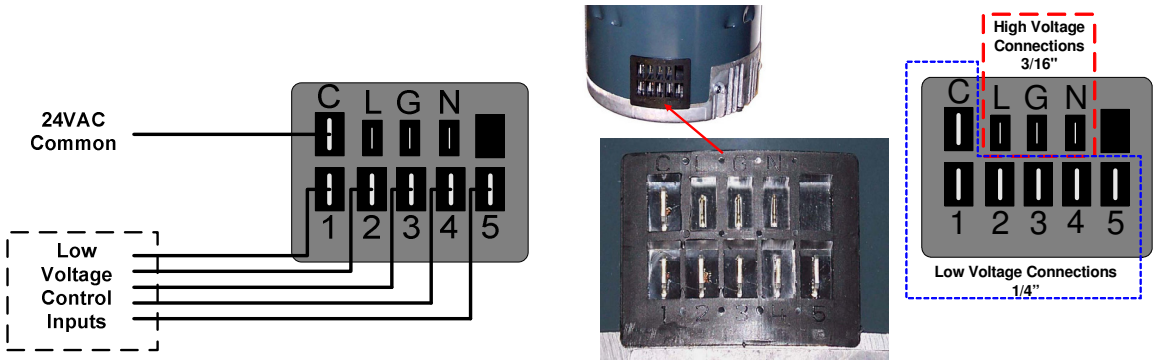
| | | |
|---|---|---|
| 115VAC model (L) = L1 115VAC | (G) = Ground | (N) = Neutral |
| 230VAC model (L) = L1 115VAC | (G) = Ground | (N) = L2 115VAC |
| 460VAC model (L) = L1 277VAC | (G) = Ground | (N) = LC 277VAC |



The high voltage is connected to the motor at all times. This power is what operates the internal electronics and drives the motor. However, this power will not operate the motor by itself; the motor requires a low voltage communication input to operate. The low voltage communication to the motor is delivered to taps 1-5 and the (C) terminal from the HVAC OEM control board or control relay. The X13 motor has the capability of accepting a communication signal of 9-23VDC as well as 24VAC on these taps. 24VAC is most commonly used. Instead of energizing a motor speed (winding) on a PSC motor for each demand (heat cool, constant fan); the communication voltage directs the motor to operate at the torque value stored in the tap it is connected to. The HVAC OEM will show which taps are to be selected for each demand, similar to selecting the speeds on a PSC motor.




During each demand, the X13 motor will maintain the selected torque during changes in the systems external static pressure (constant torque). If ESP increases the motor will use more power (current) to maintain torque. The motor has a programmed limit of operation to protect itself from damage, due to the energy it must use to maintain torque at high external static pressures. If the systems maximum total ESP is exceeded, torque will not be maintained, however the motor will deliver as much torque as possible, without causing damage to itself.

The HVAC OEM can choose to wire this motor with individually wired terminals, connectors/plugs or both. Improper wiring may result in no operation, improper operation and/or damage to the motor.

Even though changing the low voltage tap connections does change the speed of the motor, it is important, in theory at least, to understand that these are programmed levels of torque. Referring to the taps as “speeds” or “speed taps” could be confusing if the following key points are not also understood.

- The HVAC OEM could program the taps in any order they choose. For example they could put the higher cooling airflow selection on Tap 1 and the lower heating airflow selection on Tap 2. Most manufacturers are programming the motor starting at Tap 1 and building in torque values respectively.

- Each tap can have a unique amount of torque programmed for a specific purpose. For example switching from Tap 1 to Tap 2 may very well increase the airflow but not necessarily at a specific interval like changing from low speed to medium low speed on a PSC motor would. Even more important, each motor has a unique program. Changing taps on one X13 motor will most likely have different results than any other.

- It is not necessary to program all of the taps. If the manufacturer only needs two functions, they may only program two taps, and so on up to five. All X13 motors will physically have 5 taps.

- Multiple taps could be energized by the HVAC OEM at the same time. Unlike a PSC motor, energizing multiple taps on the X13 will not harm the motor. The X13 will simply operate at the highest tap number, which will typically be the highest torque value.

**Application**

Most residential HVAC OEM are using the X13 motor in some of their split system air handlers and package systems, single stage applications. The X13 motor could also be used in gas and oil furnaces.

**Benefit**

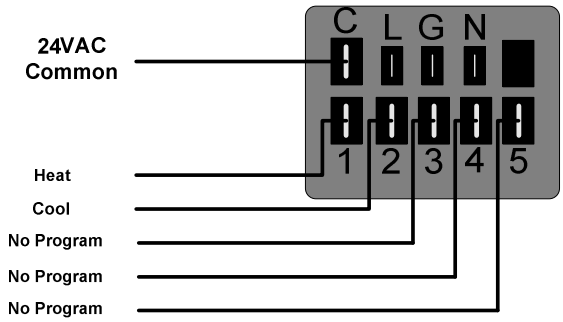
Constant torque allows the X13 motor to maintain the torque (current) delivered to the motor when ESP is higher than recommended and/or changes during system operation. ESP (the resistance to the movement of air) is increased when ductwork is undersized, poorly constructed and/or full or dirt or debris. ESP can increase during system operation when dirt builds up on the air distribution systems components, especially the filter, and when customers close or block grilles and registers. When torque is maintained, airflow does not decrease as fast as it would on a PSC motor system. This decreases the effect ESP has on loss of airflow, providing better system performance and efficiency within the limits of the motor design.

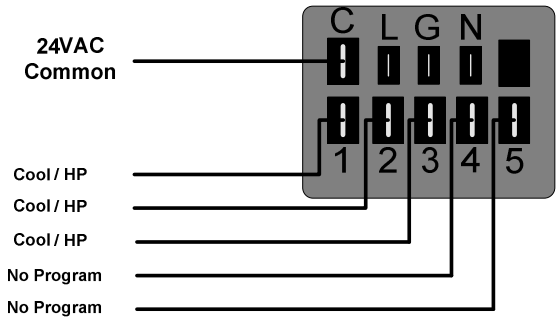
The ability to program the torque value by demand allows the HVAC OEM to deliver more precise airflow and only program the amount of selections needed.

The X13 motor provides the energy savings of an ECM with the simplicity of traditional PSC motor set-up and service.

**Installation/Set-up**

The HVAC OEM may program only the taps needed for the application the motor is used in, or program additional taps for multiple sizes of connected systems (A/C or Heat Pump). The HVAC OEM will provide a table or diagram showing which tap is to be used for heating, cooling and constant fan selections depending on the equipment it is used in. The heating or cooling selection may be used for constant fan operation as was done with many PSC induction motor controls, or one of the taps may be programmed specifically for constant fan operation.

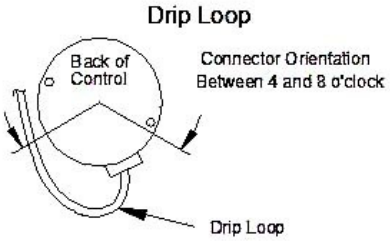



The X13 motor has no programmable (On) delays but multiple (Off) delays can be programmed into the motor. If an off delay is programmed into the motor it will not be adjustable. The HVAC OEM could however delay the low voltage communication from their controls or circuit board to gain an adjustable on or off delay if desired.

This information is HVAC OEM specific and listed in the installation and service manuals for each unit. These manuals must be used to properly set-up the system at the time of installation. Tap selections should never be changed to adjust airflow without checking these manuals first.

If these selections are not set at the time of installation, there is a good chance the system will not perform as expected or produce the designed capacity. In addition the system may be prone to problems and/or premature parts failure.




It is recommended that the electrical connections on the ECM be facing down or between the 4 and 8 o-clock position, and a drip loop formed out of the wiring harness leaving the motor. This is to prevent any moisture or water that may get into the motor area from running into the connectors where it could cause damage to the control. In most systems, the HVAC OEM will install the motor in the correct position and provide the drip loop. However, when multi-position systems are installed in a position other than the manufactured position, the motor may need to be turned and the drip loop re-arranged.

The total external static pressure (ESP) of the installed system should be measured and compared to the HVAC OEM charts. If it is above the maximum listed for that unit, improvements should be made to lower it. Any total ESP below the maximum is typically acceptable as long as it produces the required amount of airflow for the installed system. Use the HVAC OEM performance charts to compare the total ESP measured to the delivered airflow per tap. System efficiency, noise levels and potential service issues will all be improved when the total ESP is as close to the HVAC OEM recommendation as possible. HVAC OEM installation manuals provide guidelines that should be followed per unit for best performance. Some important examples of the guidelines found in these manuals include filter sizing charts, proper duct connections and unit cut-outs. On fossil fuel systems, the temperature rise should always be measured and corrected if not within the HVAC OEM rating on the data plate of that unit.

Note: Water damage is one of the most reoccurring failures with electrical components. Always construct and size the condensate drains and traps by the HVAC OEM specifications.

**Troubleshooting**

Before troubleshooting any HVAC system, it's a good practice to become familiar with the components and wiring diagram, check for and follow any on board diagnostics (HVAC OEM system fault codes). On X13 motor systems it's also a good practice to check the tap selections and delay settings. The HVAC OEM manuals will typically be required for these settings and can also provide valuable sequence of operation and troubleshooting help.

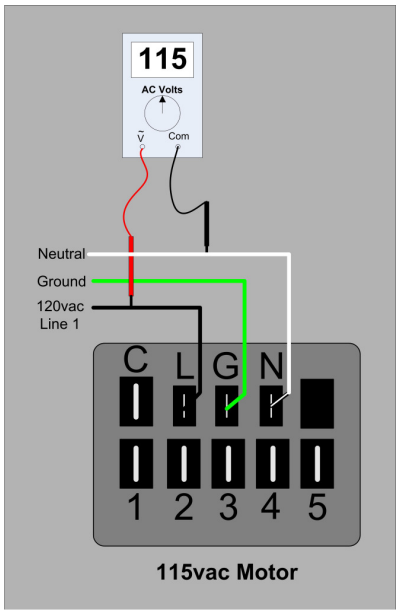
*If the motor is running* but the system is noisy, shutting down on its limits or safeties or the evaporator coil is freezing, there is a good chance the motor is good. The problem is most likely external to the motor.

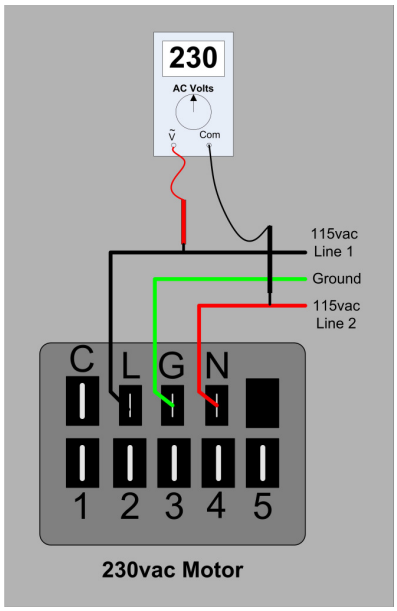
- Check the tap selections using the HVAC OEM guide
- Check the air distribution system components for dirt load and closed dampers, registers and grilles.
- Measure the total external static pressure. Make repair(s) if above the HVAC OEM recommended maximum level and confirm airflow at the new total ESP with the performance charts. Aftermarket filter sizing is a common issue.

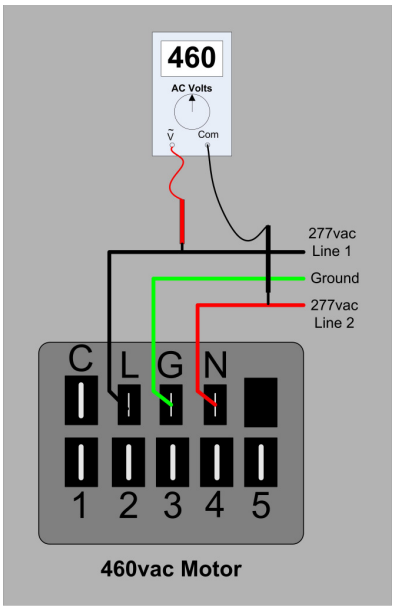
*If the motor is not running*, the following checks will diagnose whether it is operational. **Always disconnect the power to the HVAC system before disconnecting or reconnecting any connectors to these motors.** There are two inputs needed to operate this motor, a high voltage constant power source, and the low voltage communication that selects the torque value in each tap per demand.

- **Checking the high voltage input**

First check the high voltage to terminals (L) and (N). There should be 115VAC, 230VAC or 460VAC depending on the model between these two terminals whenever there is power to the system, regardless of a demand call. Applying incorrect high voltage to the X13 motor may cause the motor to not operate, or even damage the motor. On 115VAC systems, make sure the polarity of the power connected to the motor is correct. If this voltage is missing, fix the problem in the system and try to run the motor. If the voltage is within ± 10% of these ratings then move on to the next step. If the voltage is above or below the ± 10% of these ratings, fix the voltage problem first, and try to run the motor. Proper grounding should always be checked and repaired if needed.



- **Checking the low voltage communication input**

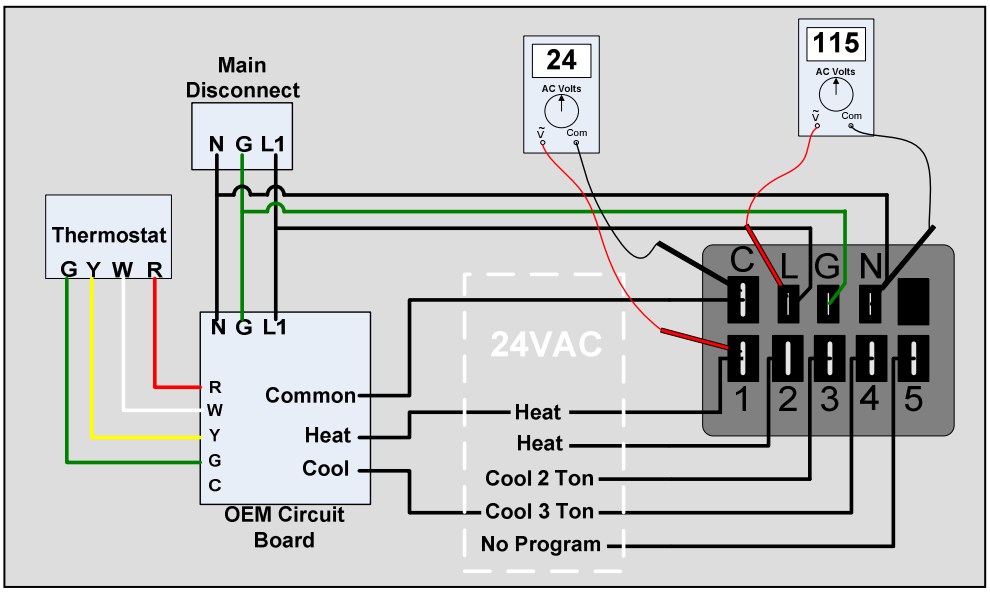
The following information must be known before troubleshooting the low voltage communication to this motor.

- Which tap(s) have been programmed and what are their purposes (heating airflow, cooling airflow, constant fan airflow).

- Where on the manufacturer's controls or circuit board the low voltage communication comes from by demand.

- The sequence of operation of the manufacturer's controls or circuit board (when the low voltage communication is sent to the motor from each thermostat demand and if there are any delays).

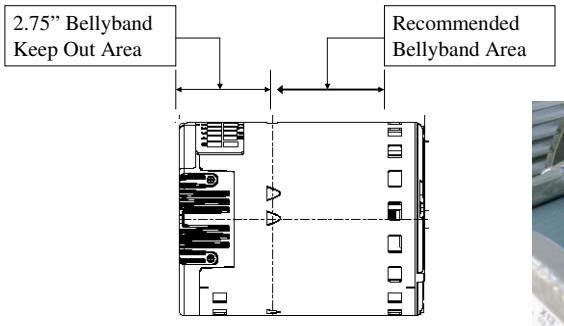
If no low voltage communication (typically 24vac) is measured at the motor on taps 1-5, check the HVAC system wiring, controls and demand call. Always check low voltage between terminals 1-5 and (C) at the motor, never ground. Once the problem is corrected, confirm that the low voltage communication is applied to a programmed tap. If proper low voltage communication is present at a programmed tap, with proper high voltage to the motor and it still does not operate, the motor is failed.

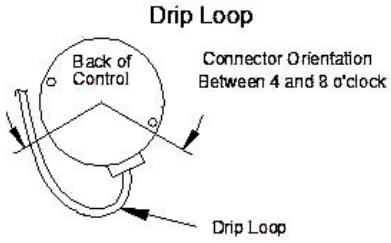



## Repair

The X13 motor is programmed specifically for each HVAC OEM model and size unit it is used in. The replacement motor must be an exact match to the system it was removed from including the voltage. There are no universal replacement motors. Using the wrong motor voids all product warranties and may produce unexpected results. Always follow all instructions included with the replacement motor.

The X13 motor should be mounted so that the belly band does not cover any of the motor vents, and is not located in the “Keep Out Area” approximately 2.75” from the control end of the motor. The connectors should be facing down when the blower section is in the system and the wires leaving the motor should be formed into a drip loop. If there is any sign of water damage on the old motor, correct the water issue.






The X13 motor may rock back and forth when it first turns on. This is normal operation for the control to figure out the proper direction to operate the motor.

The X13 motor may come to a stop at the end of a demand call (after any delays) much faster than other motors. This is a programmed “braking” function and is also normal. This function may or may not be utilized by all HVAC OEM.

Always check the wiring and proper operation of the entire system (including system safeguards) after all service and repair work.

**Conclusion**

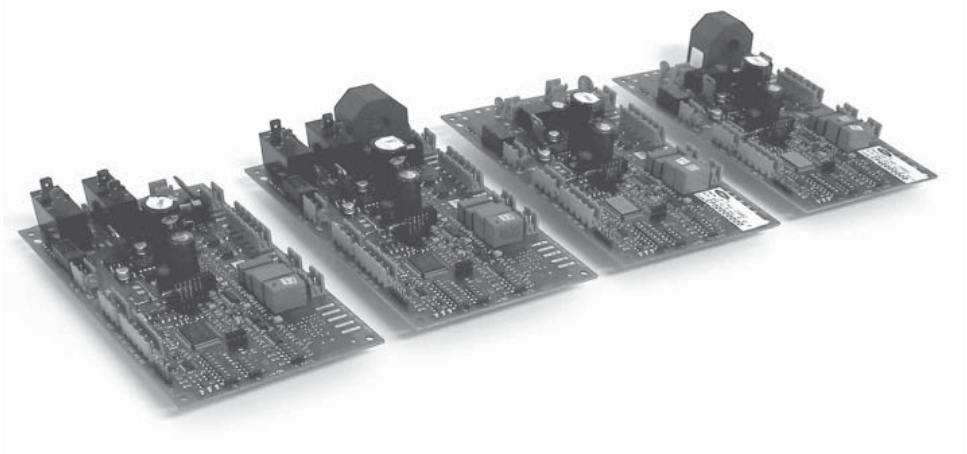
The X13 motor produced by Genteq is built with 6 generations of ECM technology. Reliability improvements over these generations include:

- Fully encapsulated electronics to protect against moisture damage
- EMI filter to provide protection against line transient (voltage spikes)
- Speed limiting to prevent over-current operation due to extremely high static pressure operation
- Durable ball bearings on all models

With proper installation, set-up and annual system maintenance, these motors are providing proven reliability in today’s HVAC systems.

The HVAC OEM has many programming options for each type of system this motor is used in. It is imperative that the contractor consult installation and service manuals to set up the system properly and take advantage of all of its capabilities. Attending the HVAC OEM classes on constant torque motor products, as with all products, is also highly recommended.

CP* - schede per il controllo degli umidificatori OEM KUE* /
*Control boards for KUE* OEM humidifier kits*



# ITA Manuale d'uso

(Dall'Hardware 2.0 e software 1.7, indicati con la sigla "2.3"sull'etichetta a bordo scheda /
*From Hardware 2.0 and software 1.7, marked with the initial "2.3" on the board-label*)

# ENG User manual

# FRE Manuel d'utilisation

# GER Technisches Handbuch

**LEGGI E CONSERVA QUESTE ISTRUZIONI**
**READ AND SAVE THESE INSTRUCTIONS**

Integrated Control Solutions & Energy Savings

## IMPORTANTE!

ITA

La scheda CP si blocca dopo 3000 ore di produzione affinché venga controllato lo stato del cilindro per l'eventuale sostituzione. Il blocco è indicato con 8 lampeggi brevi del led rosso.

Un warning è generato dopo 2000 ore (7 lampeggi brevi).

Per far ripartire la scheda CP, agire sul dip B1 come descritto nel capitolo "Funzionalità della scheda CP (dip switch e altre funzioni)".

## IMPORTANT!

ENG

The CP board stops operating after 3000 hours of steam production, so that the condition of the cylinder can be checked and the cylinder replaced if necessary. This event is indicated by 8 short flashes of the red LED.

A warning is generated after 2000 hours (7 short flashes).

To start the CP board again, use dipswitch B1 as described in the chapter "Functions of the CP board (dipswitches and other functions)".

## IMPORTANT!

FRE

La carte CP se bloque après 3 000 heures de production afin que l'état du cylindre soit contrôlé en vue d'un éventuel remplacement.
Le blocage est indiqué par 8 clignotements brefs de la DEL rouge.

Un avertissement est produit après 2000 heures (7 clignotements brefs).

Pour faire repartir la carte CP, agir sur le commutateur B1 comme décrit au chapitre «Fonctionnement de la carte CP (commutateur et autres fonctions)».

## WICHTIG!

GER

Nach 3.000 Betriebsstunden wird die CP-Platine für die Kontrolle und den eventuellen Austausch des Dampfzylinders gesperrt. Die Sperre wird mit 8 kurzen Blinkzeichen der roten LED gemeldet.

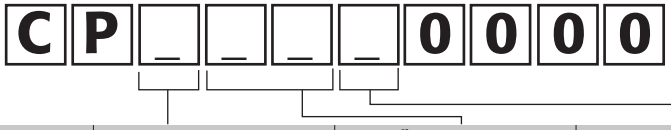
Nach 2.000 Betriebsstunden wird ein Voralarm ausgelöst (7 kurze Blinkzeichen).

Für den Neustart der CP-Platine siehe Betätigung des Dip-Schalters B1 wie im Kapitel „Funktionen der CP-Platine (Dip-Schalter und sonstige Funktionen)" beschrieben.

## Introduction

The CP* electronic board has been designed to control the KUE* OEM immersed electrode humidifiers. As the CP* board is not protected by a case or cover, it must be installed so as to avoid any accidental contact with people during operation due to high voltages and high temperatures. For installation, see the KUE immersed electrode humidifier installation and user manual (+030221791).

## Models: CPdxxvppri




| KUE model | CP Type | steam flow | Power supply |
|---|---|---|---|
| NOT CONFIGURED<br>To be configured with humiset | 0 | 00 | 0 |
| KUE*R* | 1: 1-phase, ext. TAM<br>2: 1-phase, with TAM<br>3: 1- & 3-phase, ext. TAM<br>4: 1- & 3-phase, with TAM | R1: 1.5 kg/h reduced (3.3 lbs/hr)<br>R3: 3 kg/h reduced (6.6 lbs/hr) | U: 208 Vac 1-phase<br>D: 230 Vac 1-phase |
| KUE*1* | 1: 1-phase, ext. TAM<br>2: 1-phase, with TAM<br>3: 1- & 3-phase, ext. TAM<br>4: 1- & 3-phase, with TAM | 01: 1.5 kg/h (3.3 lbs/hr) | U: 208 Vac 1-phase<br>D: 230 Vac 1-phase |
| | | 03: 3 kg/h (6.6 lbs/hr) | U: 208 Vac 1-phase<br>D: 230 Vac 1-phase<br>W: 208 Vac 3-phase<br>K: 230 Vac 3-phase<br>L: 400 Vac 3-phase<br>M: 460 Vac 3-phase |
| KUE*2* | 3: 1- & 3-phase, ext. TAM<br>4: 1- & 3-phase, with TAM | 05: 5 kg/h (11 lbs/hr) | U: 208 Vac 1-phase<br>D: 230 Vac 1-phase<br>W: 208 Vac 3-phase<br>K: 230 Vac 3-phase<br>L: 400 Vac 3-phase<br>M: 460 Vac 3-phase<br>N: 575 Vac 3-phase |
| | | 08: 8 kg/h (17 lbs/hr) | W: 208 Vac 3-phase<br>K: 230 Vac 3-phase<br>L: 400 Vac 3-phase<br>M: 460 Vac 3-phase<br>N: 575 Vac 3-phase |
| KUE*3* | 3: 1- & 3-phase, ext. TAM<br>4: 1- & 3-phase, with TAM | 09: kg/h (20 lbs/hr) | U: 208 Vac 1-phase<br>D: 230 Vac 1-phase |
| | | 10: 10 kg/h (22 lbs/hr)<br>15: 15 kg/h (33 lbs/hr) | W: 208 Vac 3-phase<br>K: 230 Vac 3-phase<br>L: 400 Vac 3-phase<br>M: 460 Vac 3-phase<br>N: 575 Vac 3-phase |
| KUE*4* | 3: 1- & 3-phase, ext. TAM | 25: 25 kg/h (55 lbs/hr)<br>35: 35 kg/h (77 lbs/hr) | W: 208 Vac 3-phase<br>K: 230 Vac 3-phase<br>L: 400 Vac 3-phase<br>M: 460 Vac 3-phase<br>N: 575 Vac 3-phase |
| | | 45: 45 kg/h (100 lbs/hr) | L: 400 Vac 3-phase<br>M: 460 Vac 3-phase<br>N: 575 Vac 3-phase |

Tab. 1

## Plug-in terminal kit

KITCONCP00: to be ordered when first purchasing the CP board, as this is not supplied with the CP board.

## Options

| | |
|---|---|
| External display with 3 LEDs | UMKDP00000 |
| Serial communication board (CAREL or Modbus® protocol with gateway code GATEWAYMB0 to be ordered separately) | TACP485000 |
| DIN rail supports (5 pcs.) | CPCASE0001 |

## Technical specifications

| | |
|---|---|
| Power supply: | 24 Vac, from -15 % to +10 %, 50/60 Hz |
| Power input: | 9 VA (solenoid valves not included) – 35 VA max. (valves included) |
| Digital outputs (relay: micro-switching type 1C): | electrode power supply (CP1* and CP2* boards): 2 SPST relays, 250 Vac 20 A resistive (12 A inductive cosφ= 0.4); minimum number of switching cycles: 100,000 |
| | control for external contactor for electrodes (CP3* and CP4* boards): 1 SPST relay, 250 Vac 5 A (2 A); minimum no. of switching cycles: 100,000 |
| | alarm signal relay: 1 SPST relay (cumulative), 250 Vac 5 A (2 A) |
| Digital inputs: | **AB-AB** (remote ON/OFF): external voltage-free contact:<br>**ON=** contact closed (Rmax with the contact closed= 50 Ω, Imax with the contact closed= 10 mA);<br>**OFF=** contact open (Vmax at the tips of the open contact= 32 Vdc) |
| | **VR-SET** (humidistat)**:** external voltage-free contact for ON/OFF control of production.<br>Used alternatively to the SET-GND connection (see "Analogue inputs").<br>**START PRODUCTION=** contact closed (Rmax with the contact closed= 50 Ω, Imax with the contact closed= 10 mA);<br>**END PRODUCTION=** contact open (Vmax at the tips of the open contact= 10 Vdc) |
| | Manual drain: 2 complementary external voltage-free contacts:<br>**ON-GND:** closed= control enabled, Rmax with the contact closed= 50 Ω Imax with the contact closed= 5 mA;<br>open= control disabled, Vmax at the tips of the open contact= 5 Vdc<br>**DR-GND:** closed= drain ON, Rmax with the contact closed= 1 Ω, Imax with the contact closed = 0.5 A;<br>open= drain OFF , Vmax at the tips of the open contact= 24 Vac |
| Analogue inputs: | **SET-GND** (steam production demand from external controller; input impendence 15 kΩ): 0 to 10 V (default), (2 to 10 V, 0 to 1 V selected only via RS485)<br>Used alternatively to VR-SET (see "Digital inputs") |
| Operating conditions: | 0T60 °C; <90% RH non-condensing |
| Storage conditions: | -10T70 °C; <90% RH non-condensing |
| Environmental pollution: | normal |
| TAM | CP1* and CP3* boards: external TAM code 09C412A017 / CP2* and CP4* boards: already on board |
| Index of protection | IP00 |
| Distance between CP and KUE (TAM, level, conductivity): maximum cable length 20 m (individually shielded) | |

Tab.2

## KUE-CP: hardware configuration and rated data

CP2* and CP4*: TAM on board (ref. Figs. 2 and 4)

| OEM code | kg/h (1) (2) | kW | Vac | Ph | Inom [A] | CP* board | | Turns | TAM RATE | TAM (fi g. 4.a) | Cable(3) [mm²] | Ext. fuses [A/type] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KUESR* | 1.5 | 1.13 | 200 | 1 | 5.6 | CP2R1C* | CP4R1C* | 1 | 20 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 208 | 1 | 5.4 | CP2R1U* | CP4R1U* | 1 | 20 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 230 | 1 | 4.9 | CP2R1D* | CP4R1D* | 2 | 20 | d | 1.5 | 10A/gG |
| KUESR* | 3.0 | 2.25 | 200 | 1 | 11.3 | CP2R3C* | CP4R3C* | 2 | 60 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 1 | 10.8 | CP2R3U* | CP4R3U* | 2 | 60 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 1 | 9.8 | CP2R3D* | CP4R3D* | 1 | 20 | a | 2.5 | 16A/gG |
| KUES1* | 1.5 | 1.13 | 200 | 1 | 5.6 | CP201C* | CP401C* | 1 | 20 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 208 | 1 | 5.4 | CP201U* | CP401U* | 1 | 20 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 230 | 1 | 4.9 | CP201D* | CP401D* | 2 | 20 | d | 1.5 | 10A/gG |
| KUES1* | 3.0 | 2.25 | 200 | 1 | 11.3 | CP203C* | CP403C* | 2 | 60 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 1 | 10.8 | CP203U* | CP403U* | 2 | 60 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 1 | 9.8 | CP203D* | CP403D* | 1 | 20 | a | 2.5 | 16A/gG |

| OEM code | kg/h (1) (2) | kW | Vac | Ph | Inom [A] | CP* board | | Turns | TAM RATE | TAM (fi g. 4.a) | Cable(3) [mm²] | Ext. fuses [A/type] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KUET1* | 3.0 | 2.25 | 200 | 3 | 6.5 | CP403J* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 3 | 6.2 | CP403W* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 3 | 5.6 | CP403K* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 400 | 3 | 3.2 | CP403L* | | 2 | 20 | d | 1.5 | 10A/gG |
| | 3.0 | 2.25 | 460 | 3 | 2.8 | CP403M* | | 2 | 20 | d | 1.5 | 10A/Gg |
| KUES2* | 5.0 | 3.75 | 200 | 1 | 18.8 | CP405C* | | 1 | 40 | a | 6.0 | 32A/Gg |
| | 5.0 | 3.75 | 208 | 1 | 18.0 | CP405U* | | 1 | 40 | a | 6.0 | 32A/Gg |
| | 5.0 | 3.75 | 230 | 1 | 16.3 | CP405D* | | 1 | 40 | a | 6.0 | 32A/gG |
| KUES3* | 8.7 | 6.52 | 208 | 1 | 31.4 | CP309U* | CP409U* | 1 | 60 | a | 16.0 | 50A/gG |
| | 9.0 | 6.75 | 230 | 1 | 29.3 | CP309D* | CP409D* | 1 | 60 | a | 10.0 | 40A/gG |
| KUET2* | 5.0 | 3.75 | 200 | 3 | 10.8 | CP405J* | | 2 | 60 | d | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 208 | 3 | 10.4 | CP405W* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 230 | 3 | 9.4 | CP405K* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 400 | 3 | 5.4 | CP405L* | | 1 | 20 | a | 1.5 | 10A/gG |
| | 5.0 | 3.75 | 460 | 3 | 4.7 | CP405M* | | 2 | 20 | d | 1.5 | 10A/gG |
| | 5.0 | 3.75 | 575 | 3 | 3.8 | CP405N* | | 2 | 20 | d | 1.5 | 10A/gG |
| KUET2* | 8.0 | 6.00 | 200 | 3 | 17.3 | CP408J* | | 1 | 40 | a | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 208 | 3 | 16.7 | CP408W* | | 1 | 40 | a | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 230 | 3 | 15.1 | CP408K* | | 2 | 60 | d | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 400 | 3 | 8.7 | CP408L* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 8.0 | 6.00 | 460 | 3 | 7.5 | CP408M* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 8.0 | 6.00 | 575 | 3 | 6.0 | CP408N* | | 1 | 20 | a | 2.5 | 16A/gG |
| KUET3* | 10.0 | 7.50 | 200 | 3 | 21.7 | CP410J* | | 1 | 60 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 208 | 3 | 20.8 | CP410W* | | 1 | 40 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 230 | 3 | 18.8 | CP410K* | | 1 | 40 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 400 | 3 | 10.8 | CP410L* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 10.0 | 7.50 | 460 | 3 | 9.4 | CP410M* | | 1 | 20 | a | 2.5 | 16A/gG |
| | 10.0 | 7.50 | 575 | 3 | 7.5 | CP410N* | | 1 | 20 | a | 2.5 | 16A/gG |
| KUET3* | 15.0 | 11.25 | 200 | 3 | 32.5 | CP415J* | | 1 | 60 | a | 16.0 | 50A/gG |
| | 15.0 | 11.25 | 208 | 3 | 31.2 | CP415W* | | 1 | 60 | a | 16.0 | 50A/gG |
| | 15.0 | 11.25 | 230 | 3 | 28.2 | CP415K* | | 1 | 60 | a | 10.0 | 40A/gG |
| | 15.0 | 11.25 | 400 | 3 | 16.2 | CP415L* | | 1 | 40 | a | 6.0 | 32A/gG |
| | 15.0 | 11.25 | 460 | 3 | 14.1 | CP415M* | | 1 | 20 | a | 4.0 | 20A/gG |
| | 15.0 | 11.25 | 575 | 3 | 11.3 | CP415N* | | 1 | 20 | a | 4.0 | 16A/gG |

**Tab. 3**

CP1* and CP3* external TAM (ref. Figs. 1 e 3)

| OEM code | kg/h | kW | Vac | Ph | Inom | CP* board | Turns | TAM JUMPER | TAM (fi g. 4.a) | Cable(3) [mm²] | Fuse [A/type] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KUESR* | 1.5 | 1.13 | 200 | 1 | 5.6 | CP1R1C* | 1 | 100 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 208 | 1 | 5.4 | CP1R1U* | 1 | 100 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 230 | 1 | 4.9 | CP1R1D* | 2 | 100 | d | 1.5 | 10A/gG |
| KUESR* | 3.0 | 2.25 | 200 | 1 | 11.3 | CP1R3C* | 2 | 300 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 1 | 10.8 | CP1R3U* | 2 | 300 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 1 | 9.8 | CP1R3D* | 1 | 100 | a | 2.5 | 16A/gG |
| KUES1* | 1.5 | 1.13 | 200 | 1 | 5.6 | CP101C* | 1 | 100 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 208 | 1 | 5.4 | CP101U* | 1 | 100 | a | 1.5 | 10A/gG |
| | 1.5 | 1.13 | 230 | 1 | 4.9 | CP101D* | 2 | 100 | d | 1.5 | 10A/gG |
| KUES1* | 3.0 | 2.25 | 200 | 1 | 11.3 | CP103C* | 2 | 300 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 1 | 10.8 | CP103U* | 2 | 300 | d | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 1 | 9.8 | CP103D* | 1 | 100 | a | 2.5 | 16A/gG |
| KUET1* | 3.0 | 2.25 | 200 | 3 | 6.5 | CP303J* | 1 | 100 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 208 | 3 | 6.2 | CP303W* | 1 | 100 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 230 | 3 | 5.6 | CP303K* | 1 | 100 | a | 2.5 | 16A/gG |
| | 3.0 | 2.25 | 400 | 3 | 3.2 | CP303L* | 2 | 100 | d | 1.5 | 10A/gG |
| | 3.0 | 2.25 | 460 | 3 | 2.8 | CP303M* | 2 | 100 | d | 1.5 | 10A/Gg |
| KUES2* | 5.0 | 3.75 | 200 | 1 | 18.8 | CP305C* | 2 | 500 | d | 6.0 | 32A/Gg |
| | 5.0 | 3.75 | 208 | 1 | 18.0 | CP305U* | 2 | 500 | d | 6.0 | 32A/Gg |
| | 5.0 | 3.75 | 230 | 1 | 16.3 | CP305D* | 2 | 500 | d | 6.0 | 32A/gG |
| KUES3* | 8,7 | 6,53 | 208 | 1 | 31,4 | CP309U* | 1 | 500 | a | 16,0 | 50A/gG |
| | 9,0 | 6,75 | 230 | 1 | 29,3 | CP309D* | 1 | 500 | a | 10,0 | 40A/gG |

| OEM code | kg/h | kW | Vac | Ph | Inom | CP* board | Turns | TAM JUMPER | TAM (fi g. 4.a) | Cable[3] [mm²] | Fuse [A/type] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KUET2* | 5.0 | 3.75 | 200 | 3 | 10.8 | CP305J* | 2 | 300 | d | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 208 | 3 | 10.4 | CP305W* | 1 | 100 | a | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 230 | 3 | 9.4 | CP305K* | 1 | 100 | a | 2.5 | 16A/gG |
| | 5.0 | 3.75 | 400 | 3 | 5.4 | CP305L* | 1 | 100 | a | 1.5 | 10A/gG |
| | 5.0 | 3.75 | 460 | 3 | 4.7 | CP305M* | 2 | 100 | d | 1.5 | 10A/gG |
| | 5.0 | 3.75 | 575 | 3 | 3.8 | CP305N* | 2 | 100 | d | 1.5 | 10A/gG |
| KUET2* | 8.0 | 6.00 | 200 | 3 | 17.3 | CP308J* | 2 | 500 | d | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 208 | 3 | 16.7 | CP308W* | 2 | 500 | d | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 230 | 3 | 15.1 | CP308K* | 2 | 300 | d | 6.0 | 32A/gG |
| | 8.0 | 6.00 | 400 | 3 | 8.7 | CP308L* | 1 | 100 | a | 2.5 | 16A/gG |
| | 8.0 | 6.00 | 460 | 3 | 7.5 | CP308M* | 1 | 100 | a | 2.5 | 16A/gG |
| | 8.0 | 6.00 | 575 | 3 | 6.0 | CP308N* | 1 | 100 | a | 2.5 | 16A/gG |
| KUET3* | 10.0 | 7.50 | 200 | 3 | 21.7 | CP310J* | 1 | 300 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 208 | 3 | 20.8 | CP310W* | 1 | 300 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 230 | 3 | 18.8 | CP310K* | 1 | 300 | a | 6.0 | 32A/gG |
| | 10.0 | 7.50 | 400 | 3 | 10.8 | CP310L* | 1 | 300 | a | 2.5 | 16A/gG |
| | 10.0 | 7.50 | 460 | 3 | 9.4 | CP310M* | 1 | 100 | a | 2.5 | 16A/gG |
| | 10.0 | 7.50 | 575 | 3 | 7.5 | CP310N* | 1 | 100 | a | 2.5 | 16A/gG |
| KUET3* | 15.0 | 11.25 | 200 | 3 | 32.5 | CP315J* | 1 | 500 | a | 16.0 | 50A/gG |
| | 15.0 | 11.25 | 208 | 3 | 31.2 | CP315W* | 1 | 500 | a | 16.0 | 50A/gG |
| | 15.0 | 11.25 | 230 | 3 | 28.2 | CP315K* | 1 | 300 | a | 10.0 | 40A/gG |
| | 15.0 | 11.25 | 400 | 3 | 16.2 | CP315L* | 1 | 300 | a | 6.0 | 32A/gG |
| | 15.0 | 11.25 | 460 | 3 | 14.1 | CP315M* | 1 | 300 | a | 4.0 | 20A/gG |
| | 15.0 | 11.25 | 575 | 3 | 11.3 | CP315N* | 1 | 300 | a | 4.0 | 16A/gG |
| KUET4* | 25 | 18.75 | 208 | 3 | 52.0 | CP325W* | 1 | 300[4] | b | 25.0 | 8A/gG |
| | | | 230 | 3 | 47.1 | CP325K* | 1 | 300[4] | b | 25.0 | 63A/gG |
| | | | 400 | 3 | 27.1 | CP325L* | 1 | 300 | c | 16.0 | 50A/gG |
| | | | 460 | 3 | 23.5 | CP325M* | 1 | 300 | c | 10.0 | 32A/gG |
| | | | 575 | 3 | 18.8 | CP325N* | 1 | 300 | c | 6.0 | 25A/gG |
| | 35 | 26.25 | 208 | 3 | 72.9 | CP335W* | 1 | 500[4] | b | 35.0 | 100A/gG |
| | | | 230 | 3 | 65.9 | CP335K* | 1 | 500[4] | b | 35.0 | 100A/gG |
| | | | 400 | 3 | 37.9 | CP335L* | 1 | 500 | c | 16.0 | 60A/gG |
| | | | 460 | 3 | 32.9 | CP335M* | 1 | 500 | c | 16.0 | 50A/gG |
| | | | 575 | 3 | 26.4 | CP335N* | 1 | 300 | c | 10.0 | 40A/gG |
| | 45 | 33.75 | 400 | 3 | 48.7 | CP345L* | 1 | 500 | c | 25.0 | 80A/gG |
| | | | 460 | 3 | 42.4 | CP345M* | 1 | 500 | c | 16.0 | 60A/gG |
| | | | 575 | 3 | 33.9 | CP345N* | 1 | 500 | c | 16.0 | 50A/gG |

**Tab. 4**

(1) The average steam production is affected by external factors, such as: ambient temperature, quality of the supply water and steam distribution system.

(2) Tolerance on rated values: from -10% to +5 % (EN 60335-1).

(3) Recommended values refer to PVC cable, max. length 10 m laid in closed conduit, in compliance with the standards in force.

(4) Two power leads are required for each phase: only run one through the TAM.

## Dimensions and description of the boards

For the wiring diagrams, see CAREL manual code +030221791

### CP1* board: for KUE* single-phase, TAM on board

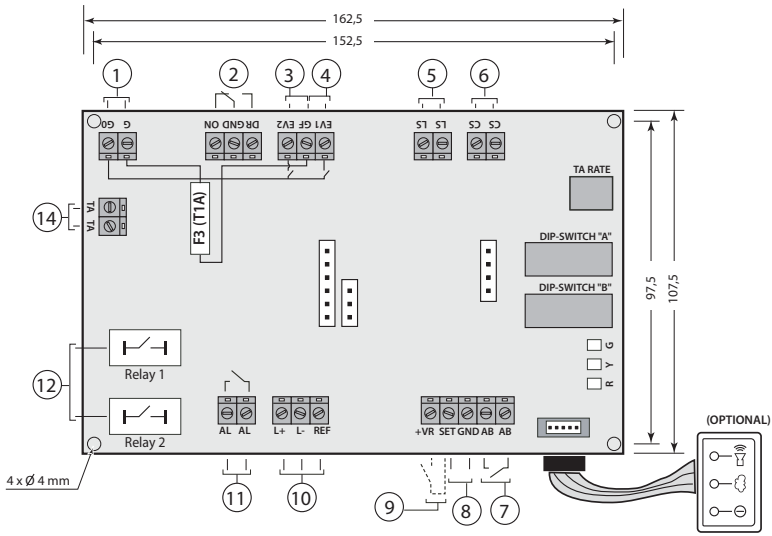



Fig.1

### CP2* board: for KUE* single-phase, TAM on board

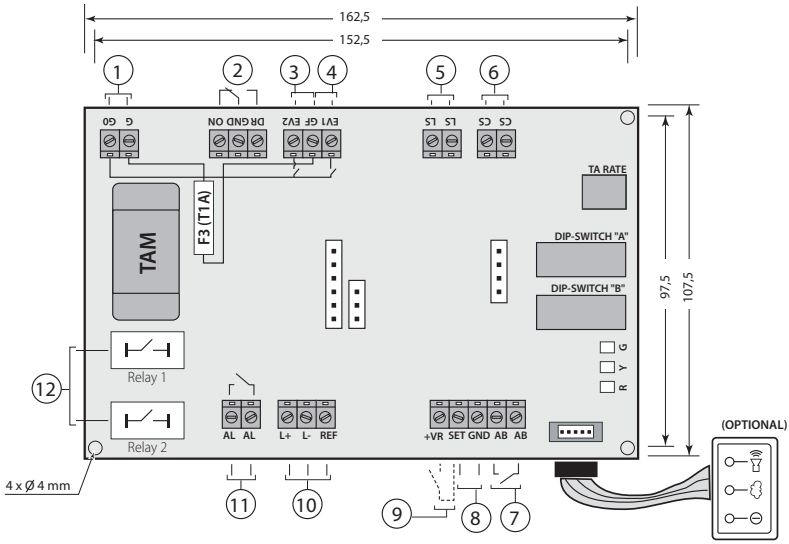



Fig.2

CP3* board: for KUE* single- and three-phase with external contactor and TAM

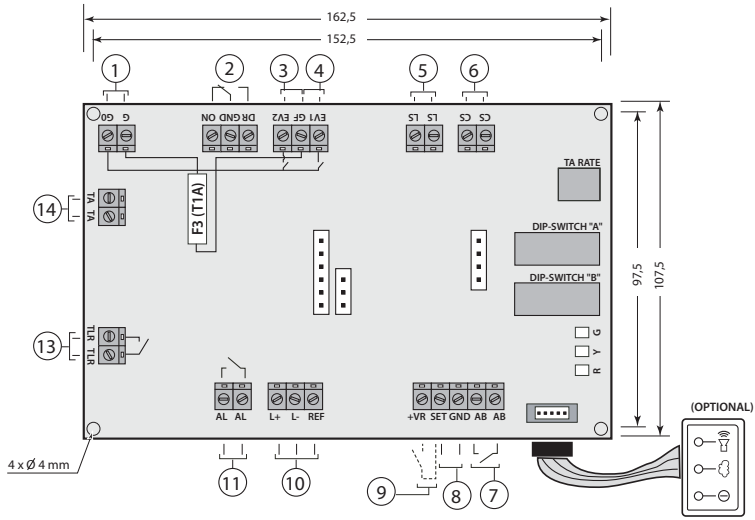



Fig. 3

CP4* board: for KUE* single- and three-phase with external contactor and TAM on board

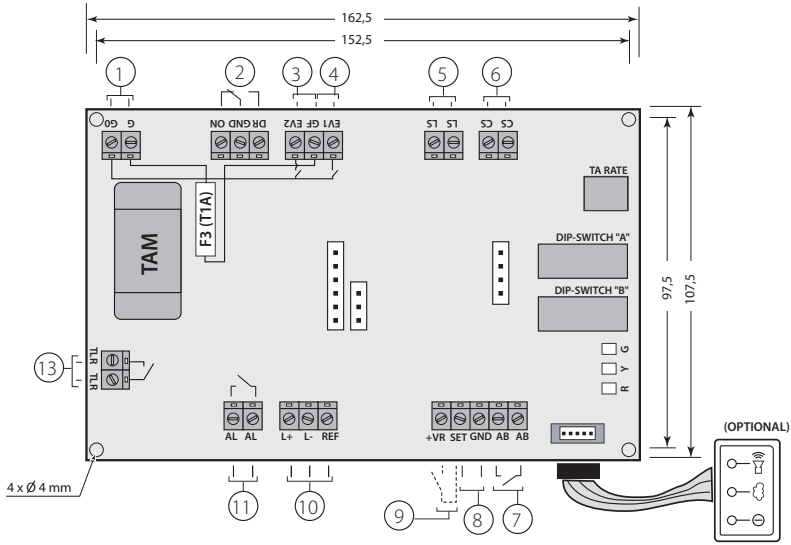



Fig. 4

Key:

| | |
|---|---|
| 1 | 24 Vac power supply |
| 2 | manual drain |
| 3 | drain solenoid valve |
| 4 | fill solenoid valve |
| 5 | high level/foam sensor |
| 6 | conductivity sensor |
| 7 | remote ON/OFF |
| 8 | external controller |
| 9 | humidistat |
| 10 | RS485 |
| 11 | alarm relay |
| 12 | to the immersed electrodes |
| 13 | to the external contactor for the immersed electrodes |
| 14 | external TAM |

## TAM

TAM on board: CP2* and CP4*

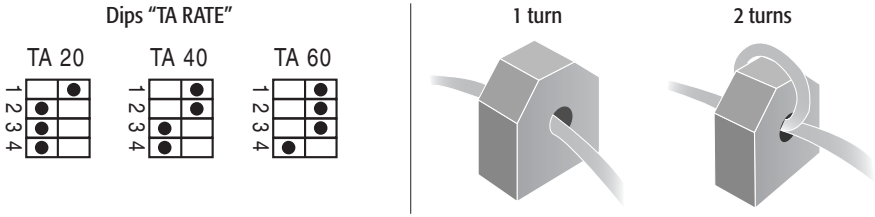



Fig.5

External TAM: CP1* and CP3*
code UEKTAM0001

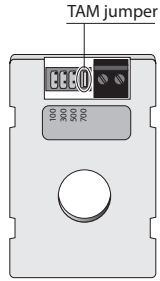



Fig.6

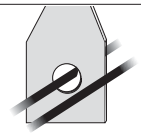
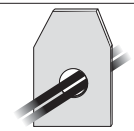
| TAM configuration | Fig. a | Fig.b | Fig.c | Fig.d |
|---|---|---|---|---|
| | one cable turn | one of two cables of the same phase | two cables of the same phase | one cable on "bouble turn" mode |
| CP* External TAM | | | | |
| CP* TAM on board | |  |  | |

Fig. 7

## Functions of the CP board (dipswitches and other functions)

This chapter provides some basic information on the functions of the CP board: for further details please contact the CAREL After-Sales Service (aftersales@carel.com).
The dipswitches not described are not used and are reserved for future use.

### DIP A2:cumulative alarm relay

The CP has a cumulative alarm relay that can be configured as follows:

**DIP A2: alarm relay status**

| | |
|---|---|
| | Relay energised (contact closed) with at least one alarm active, otherwise not energised (contact open). |
| | Relay not energised (contact open) with at least one alarm active, otherwise energised (contact closed). |

### DIP A3-A4: maximum steam production

The maximum steam production can be set between 20% and 100% of rated production (e.g. if the rated production is 8 kg/h, the maximum production can be set between 1.6 kg/h and 8 kg/h).
There are two ways to set the maximum production:

1) Using parameter P0, integer variable 2, which can have any value between 20% and 100%. P0 by default is equal to 100%. P0 can usually be set via network.
2) Using dipswitches A3-A4:

**DIP A3-4:** maximum production

| | |
|---|---|
| | 100% of rated production (if P0= 100%) |
| | 75% of rated production (if P0= 100%) |
| | 50% of rated production (if P0= 100%) |
| | 25% of rated production (if P0= 100%) |

**IMPORTANT! CP calculates the maximum production as the product of P0 and the value represented by the configuration of dipswitches A3-A4. In any case, the maximum production can never be less than 20% of the rated value**
Examples:

- if P0 = 80% and A3-A4 = 75% the maximum resulting production is equal to 80% x 75% = 0.8 x 0.75 = 0.6 = 60% of rated production
- if P0 = 30% and A3-A4 = 20% the maximum resulting production is equal to 30% x 20% = 0.3 x 0.2 = 0.06 = limited to 20% of rated production (never less than 20%)

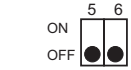
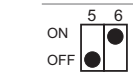
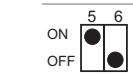
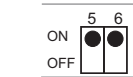
The maximum production used by CP can be read on integer variable 91 in the format ### = ##.#%
(e.g. : 800 = 80.0 %).1.
Note that if P0 is not modified from the default value (100%), the maximum production is determined solely by the setting of dipswitches A3-A4.

### Dip A5-A6: complete drain due to inactivity (starting from SW rel. 1.7)

The CP board empties the cylinder to avoid entraining stagnant water if the humidifier remains inactive, that is, on but without producing steam, for a settable period.
There are two ways to set the maximum duration of the period of inactivity:

1) Using dipswitches A5-A6:

**DIP A5-6: complete drain due to inactivity (from SW rel.1.7)**

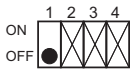
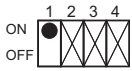
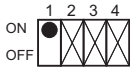
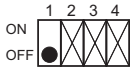
| | |
|---|---|
|   | The complete drain is performed after a period of inactivity equal to the number of days saved for parameter bF, default 3 days (bF can only be set via network) |
|   | 2 days (bF is ignored) |
|   | 3 days (bF is ignored) |
|   | one week (bF is ignored) |

2) Using parameter bF, integer variable 36, which can have any value between 1 and 199 days. bF by default is equal to 3 days. bF can usually be set via network and its value only has effect if A5 = A6 = OFF.

## Dip B1: reset hour counter and timed maintenance signals (starting from SW rel. 1.7)

The hour counter and the timed maintenance signals (described further on) can be reset as follows:

**DIP B1: reset hour counter and cylinder life alarms (from SW rel.1.7)**

| | |
|---|---|
|   | Reset hour counter and cylinder life alarms (indicated by 7 and 8 short flashes of the red LED):<br>• hour counter and life alarms active (default); |
|   | • only if B1= ON before starting the CP:hour counter and alarms deactivated |
|   | To reset the hour counter and alarms:<br>1. move the dipswitch to ON: after 5 seconds the alarm LED (red) and production LED (yellow) come on for 3 seconds (the alarms are still active and the hour counter is operating as normal); |
|   | 2. move the dipswitch back to OFF: the hour counter restarts from 0, the alarms are cancelled and production restarts. |

## Warnings and timed maintenance alarms

Starting from SW rel. 1.7 a warning and a maintenance alarm with shutdown are available, set respectively to 2000 and 3000 hours:

- the warning (no shutdown) recalls the attention of the operator to the need to carry out the periodical check of the cylinder, by the flashing of the red LED (7 short flashes) and the intermittent activation of the alarm relay (activated intermittently if no other warnings or alarms are active);
- the alarm (shutdown!) obliges the operator to check and, if necessary, replace the cylinder after 3000 operating hours from the last maintenance operation (8 short flashes of the red LED and alarm relay activated steady; the warning is shown 1000 hours before shutdown).

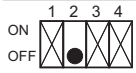
These signals have been introduced to prevent a lack of maintenance on the cylinders from damaging the units.
Both the warning and the alarm can be reset by setting the hour counter to zero using dipswitch B1.
The enabling/disabling of the function and the setting of the timeouts at 2000 and 3000 hours can usually be performed via network, by modifying parameter bb (integer variable 34); the warning is generated after "bb" hours, the shutdown alarm after "1.5x bb" hours.

**IMPORTANT!** The speed of the hour counter is not absolute, but rather proportional to the flow-rate of steam: in this way, the hours counted approximately represent the amount of lime scale accumulated in the cylinder. Example: after 100 operating hours at 100% of steam production, the hour counter shows 100 hours; on the other hand, if the average production was 75% of rated production, the hour counter would show 75 hours.

### Dip B2: drain with/without power supply to the electrodes

THe user can choose whether the drain cycles must be performed with the electrodes powered or not powered:

**DIP B2:** drain with/without power supply to the electrodes

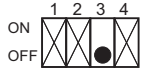
| | |
|---|---|
|  | **ON:** electrodes powered during the drain warning (risk of current leaks through the drain!)<br>**OFF** (default): electrodes not powered |

### Dip B3: drain due to reduction in production demand

The steam production of the CP corresponds to the external demand:
1) if the demand increases, CP opens the water fill valve to increase the level inside the cylinder and, consequently, the steam production;
2) if the demand decreases, there are two possible cases:
   a) the drain due to reduction in demand is enabled:
      i) in this case, if the demand decreases by less than 25% (e.g. , from 74% to 54%), the CP reaches the new steam production requirement by evaporation;
      ii) on the other hand, if the demand is decreases by at least 25% (e.g. , from 74% to 44%), the CP performs at least one drain cycle so as to quickly reduce the level and reach the new steam production in less time;
   b) the drain due to reduction in demand is disabled: irrespective of how much the production demand decreases, the CP reaches the new steam production requirement by evaporation.

The drain due to decrease in demand is enabled or disabled using dipswitch B3:

**DIP B3:** automatic drain when the production demand decreases by at least 25%

| | |
|---|---|
|  | **ON:** the new reduced demand for production is reached by evaporation<br>**OFF** (default):<br>1. the new production demand is reached by evaporation when this decreases by less than 25% compared to the previous value (e.g. from 74% to 54%)<br>2. at least one automatic drain cycle is performed when the demand decreases by at least 25% (e.g. from 74% to 44%) |

### Dip B4: enable/disable the cylinder pre-depletion and complete depletion warning

The conditions representing the pre-depletion and complete depletion of the cylinder are evaluated by the CP by estimating the amount of lime scale accumulated inside the cylinder.
In some cases, this estimate is not precise, and therefore the two warnings can be enabled/disabled, as follows:

**DIP B4** cylinder pre-depletion (2 long flashes) and depletion alarms (11 long flashes)

| | |
|---|---|
| | **ON:** the alarms are never displayed<br>**OFF** (default): the alarms are displayed when the cylinder is in the depletion phase |

### Manual calibration of the drain to dilute cycles

The drain to dilute cycles are performed automatically so as to manage the concentration of mineral salts contained in the cylinder (internal concentration):
a) if the internal concentration is too high, phenomena will arise such as foam, corrosion of the electrodes and electric discharges between the electrodes through the water;
b) if the internal concentration is too low the humidifier will be slow in following variations in the demand for steam production.

CP performs the drain to dilute cycles so as to maintain an optimum internal concentration.
The production of steam increases the concentration of salts in the water inside the cylinder, as the water evaporates without carrying away the salts: with the drain to dilute cycles, CP can return the internal concentration to the optimum values, as during each drain cycle some of the water in the cylinder is replaced with mains water, thus diluting the water inside the cylinder.
The algorithm on the CP is suitable for almost all types of water available around the world; nonetheless, in some cases the drain to dilute cycles may need to be calibrated manually.
Manual calibration is necessary if CP cannot correct/eliminate the following phenomena: foam, corrosion of the electrodes, discharges between the electrodes through the water. It is recommended to wait a few hours from such phenomena occur before performing the manual calibration procedure, so as to allow CP to act independently, unless the safety of people, animals and things is endangered.

The manual calibration should be performed by firstly increasing the frequency of the drain to dilute cycles and, only if this is not sufficient, by also increasing the duration of the cycles. Each drain cycle, in fact, affects the production of steam and reduces the efficiency of humidity control, as:

- if the contactor is open during the drain cycle, the production of steam stops for the entire drain time;
- during the next fill cycle, the mains water added reduces the water temperature inside the cylinder, thus further decreasing steam production. This effect occurs even if the contactor is closed during the drain cycle (see par. "Dip B2: drain with/ without power supply to the electrodes").

It is clear that, from the point of view of humidity control, it is preferable to have more frequent yet shorter drain cycles.

The calibration can be performed using the following settings:

1) frequency of the drain cycles: dipswitches B7-B8 or parameter b8 (the latter can usually be set via network);
2) duration of the drain cycles: dipswitches B5-B6 or parameter b9 (the latter can usually be set via network);
3) combination of dipswitches B5-B8 and parameters b8 and b9.

Dipswitches B5-B8 and parameters b8, b9 affect each other reciprocally, as follows:

- frequency of the drain cycles: dipswitches B7-B8 and parameter b8 multiply the affect of each other reciprocally if at least one of the two dipswitches is ON and b8 <> 100% (default for b8);
- duration of the drain cycles: dipswitches B5-B6 and parameter b9 multiply the affect of each other reciprocally if at least one of the two dipswitches is ON and b9 <> 100% (default for b9).

If b8 and b9 are not changed from their default value (100%), the frequency and the duration of the drain to dilute cycles are set exclusively by dipswitches B5-B8.

The manual calibration procedure, explained in detail in the following sections, is a process that occurs slowly because the effects of the changes to the frequency and/or the duration of the drain to dilute cycles take time to be seen. Phenomena such as foam, corrosion and electrical discharges through the water cannot be resolved in a short time: the manual calibration procedure should be performed with care and patience. This is why it is strongly recommended not to use of combination of dipswitches B5-B8 and parameters b8 and b9: this combination is not dangerous, however risks complicating the understanding of their effects.

### Dip B5-B8: manual calibration of the drain to dilute cycles

The recommended calibration procedure is described below. Always wait a couple of a drain to dilute cycles after each change to monitor the effect.

Calibration procedure using dipswitches B5-B8 (see further on for the configurations of the dipswitches):

1) Drain cycle frequency = + 33%
   Drain cycle duration = default
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
2) Drain cycle frequency = + 66%
   Drain cycle duration = default
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
3) Drain cycle frequency = default
   Drain cycle duration = +33%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
4) Drain cycle frequency = +33%
   Drain cycle duration = +33%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
5) Drain cycle frequency = +66%
   Drain cycle duration = +33%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
6) Drain cycle frequency = default
   Drain cycle duration = +66%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
7) Drain cycle frequency = +33%
   Drain cycle duration = +66%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop here, otherwise continue.
8) Drain cycle frequency = +66%
   Drain cycle duration = +66%
   Wait a couple of a drain to dilute cycles: if the phenomena disappear, stop, otherwise contact aftersales@carel.com.

The frequency of the drain to dilute cycles can be changed using dipswitches B7-B8:

**DIP B7-8:** frequency of the drain to dilute cycles

| | |
|---|---|
| | Frequency= calculated by CP |
| | Frequency= calculated by CP -30% |
| | Frequency= calculated by CP +33% |
| | Frequency= calculated by CP +66% |

The duration of the drain to dilute cycles can be changed using dipswitches B5-B6:

**DIP B5-6:** duration of the drain to dilute cycles

| | |
|---|---|
| | Duration= default |
| | Duration= default -30% |
| | Duration= default +33% |
| | Duration= default +66% |

### Parameters b8-b9: manual calibration of the drain to dilute cycles

Parameters b8 and b9 can be used to set the frequency and the duration of the drain to dilute cycles respectively:

- increasing b8 decreases the frequency of the drain cycles and vice-versa;
- increasing b9 increases the duration of the drain cycles and vice-versa.

b8 and b9 can usually be set via network:

- b8: integer variable 24, range 50%-200%, default 100%;
- b9: integer variable 33, range 50%-200%, default 100%.

The recommended calibration procedure is described below. Always wait a couple of a drain to dilute cycles after each change to monitor the effect

Calibration procedure using parameters b8 and b9:

1) Set b8 = 110%
2) Decrease b8 in steps of 10% (minimum value 50%)
3) Wait a couple of a drain to dilute cycles:
   a) if the phenomena disappear, stop;
   b) otherwise:
      i) if b8 > 50% , repeat from step 2)
      ii) if b8 = 50% (minimum) continue on below
4) If b9 < 200%, increase b9 in steps of 10% (maximum value 200%) and repeat from 1), otherwise contact aftersales@carel.com

The calibration procedure is explained schematically below:

| b8 | b9 |
|---|---|
| 110% | 100% |
| 100%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 100% |
| 90% | 100% |
| Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | |
| 80%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 100% |
| … | … |
| 50%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 100% |
| 100%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 110% |
| 90%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 110% |
| … | … |
| 50%<br>Wait a couple of a drain to dilute cycles:<br>• Problem resolved ➔ terminate the calibration procedure<br>• Phenomena still occurring ➔ continue on below | 200% |
| Contact aftersales@carel.com | |

## Soft-start

The soft-start procedure manages each increase in demand by filling with water until production matches demand. The fill cycles can alternate with boiling phases so as to increase the concentration of the water in the cylinder and thus reduce the time required to reach steady operation. Note that, above all when starting with an empty cylinder, the high level sensor may be touched by the water, thus activating the high level/foam procedure (see below). If the soft-start cycle is very long (> 1 day), make sure that the cylinder used is suitable for the conductivity of the mains water: see the KUE manual +030221791.

## Management of high level and foam

When water or foam activate the high level sensor, the CP board runs a partial drain cycle, after which it attempts to guarantee the steam demand by concentrating the water at the new level, lower than before the drain cycle. Before reaching demand, production at the level lower is called “reduced production”. If the high level sensor is activated too frequently by foam, the CP board runs a number of partial drain cycles followed from fill cycles with mains water so as to reduce the concentration of substances that generate the foam and thus eliminate it. If the partial drain cycles do not manage to eliminate the foam, the CP completely drains the cylinder and production restarts with an empty cylinder.

## Automatic management of supply water interruption (starting from SW rel. 1.7)

Following an interruption to the water supply, the CP board checks for water every 10 minutes and, if supply has returned, steam production restarts. On SW versions prior to 1.7 the interruption to the water supply shut down the humidifier, and this situation could only be reset by switching the CP board off and on again: now the entire procedure is handled automatically, without the operator needing to intervene.

### Chattering of the drain valve during the fill cycles (starting from SW rel. 1.7)

The chattering of the drain valve during the fill cycle is aimed at eliminating any leaks through the drain due to residual lime scale that keeps the drain valve partially open (KUE*R*-KUE*3* only). During the fill cycle, if the current does not reach the desired value in a certain time, the CP board assumes there is a leak through the drain (which would in fact cause a slow increase in the current):

as a consequence, the drain valve is opened/closed 5 times in rapid succession (chattering) so as to eliminate any debris that keeps the drain valve open. This operation is performed only once during the full cycle: when the chattering is terminated, if the current still does not reach the desired value within the timeout, the automatic management of supply water interruption procedure is started. This function is only available for the KUE with drain valves (KUE*R*, KUE*1*, KUE*2*, KUE*3*), but not for KUE*4*, as these models have the drain pump: chattering, in fact, is not allowed for the pump and, in addition, the use of the pump and of the drain column together prevent leaks through the drain due to residual lime scale.

## Complete periodical drain (starting from SW rel. 1.7)

If the complete periodical drain is enabled, the cylinder is emptied at preset intervals and production restarts with an empty cylinder. This function is useful to clear the cylinder and the filter of any viscous deposits such as those caused by water containing humus. The complete periodical drain is disabled by default. It can usually be enabled/disabled and the times modified via network, as follows:

- Enable/disable: set the bit with weight 0 of parameter b1 to 1/0 (integer variable 18);
- Compete drain time: set parameter bE (integer variable 35) between 1 and 120 hours.

The periodical drain in progress is shown by 6 short flashes of the red LED.

## Display the software release (starting from SW rel. 1.7)

The software release is only displayed when the CP board is powered up, as follows:

1) Switch the CP board off;
2) Switch the CP board back on;
3) The green LED comes on, indicating that the board is powered;
4) Count the number of flashes of the yellow LED (e.g. 1 flash);
5) Count the number of flashes of the red LED (e.g. 7 flashes). The count ends when the 3 LEDs come on together..

In the example, the SW release is 1.7.

## Alarms

Type of alarms

| Type of alarm | Response to the alarm | Alarm reset (if the causes of alarm have been resolved) | Alarm signal | Cumulative alarm relay |
|---|---|---|---|---|
| Shutdown | The CP board shuts down the OEM | • manual reset: to re-start, switch the cp board off and on or send a hardware reset command via RS485 | • Alarm codes: each alarm is displayed in sequence<br>• The alarm codes are displayed even if the causes have been resolved. switch the CP board OFF and ON or send a reset command via RS485 to cancel the alarm messages. | SPST relay that can work as either N.O. or N.C. contact according to dip switch A2.<br>by default, the alarm relay is N.O.<br><br>The action of the relay is cumulative and is activated when at least one alarm occurs.<br>the example shown below refers to an N.O. contact (opposite for the N.C. configuration):<br>• the contact is closed when at least one alarm is activated<br>• the contact is open when all the causes of the alarms have been eliminated and all the alarms have been reset.<br><br>N.B.: set dipswitch A2 as required<br><br>N.B.: not all the alarms are associated with the alarm relay (see the table below) |
| Disable | The CP board shuts down the OEM | • Automatic reset: no action required.<br><br>• Manual reset: to re-start, switch the cp board off and on or send an alarm reset command via rs485<br><br>N.B.: the table below shows the type of reset for each disabling alarm. | | |
| Warning | The CP board does not shuts down the OEM | • Automatic reset: no action required. | | |

Tab. 5

## LIST OF ALARMS

IMPORTANT: BEFORE WORKING ON ANY OF THE COMPONENTS, REMEMBER TO SWITCH THE UNIT OFF!
RISK OF ELECTRICAL SHOCK!

| | | | | Allarm | | |
|---|---|---|---|---|---|---|
| Flashes Red LED | Description | Causes | Solutions | Type | Reset | Alarm relay |
| 2 short | Excess electrode current: current> maximum limits shown in the graphs at the end of the list of alarms | 1. Conductivity of the water too high | a. The water conductivity must be between 125 and1250 µS/cm: bring the water within the limit values shown in the table at the end of the list of alarms. **IMPORTANT: softening the water may worsen the problem!** | Shut down | Manual | Active |
| | | 2. Level of water high due to leaking of the fill valve. | b. Check for any leaks on the fill valve and clean/replace it. | | | |
| | | 3. Level of water high due to malfunction of the drain valve/manifold. | c. Check that the drain valve is working correctly:<br>1. Switch the unit off;<br>2. Remove the jumper between ON-GND;<br>3. Short-circuit DR-GND;<br>4. Switch the unit on;<br>5. Can the noise of the drain valve opening be heard?<br>i. YES: remove the drain valve and clean the valve and the manifold<br>ii. NO: replace the valve. | | | |
| | | 4. Electrode malfunction (for example, lime scale bridge between electrodes, electrodes in contact with each other) | d. Replace the cylinder. | | | |
| | | 5. TAM electrical circuit not configured correctly | e. Refer to aa | | | |
| | | 6. Malfunction in the TAM electrical circuit | f. Refer to bb. | | | |
| 3 short | No currentThis occurs when the following conditions are true:<br>i. Filling with water ii. the water reaches the high level electrodes iii. the current is < 5% Inom<br>When these conditions occur, the cylinder is emptied and the alarm is displayed. | 7. The mains power supply does not deliver enough energy. | g. Check the correct operation of the mains power supply, including the external fuses and the main switch. | Shut down | Manual | Active |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 8. Malfunction in the power wiring to the cylinder. | h. Check the correct operation of the cables from the external contactor to the cylinder: replace if necessary. | | | |
| | | 9. TAM electrical circuit not configured correctly. | i. Refer to aa | | | |
| | | 10. Malfunction in the TAM electrical circuit. | j. Refer to bb | | | |
| | | | | | | |
| 4 short | Internal memory error | 11. The software or the configuration parameters are corrupted. | k. Download the correct configuration via humiSet.<br>l. Replace the controller.<br>m. If the problem persists, contact the CAREL service department | Shut down | Manual | Active |
| | | | | | | |
| 5 short | Conductivity of the water too high. The alarm occurs:<br>• After 1 hour if conductivity > b6 for more than 1 hour, OR<br>• Immediately if conductivity > 3x b6 | 12. Parameter b6 too low (b6 = high water conductivity alarm threshold) | n. If possible, set b6 to 1250 µS/cm via RS485. | Shut down | Manual | Active |
| | | 13. Conductivity of the water higher than 1250 µS/cm. | o. The water conductivity must be between 125 and1250 µS/cm: bring the water within the limit values shown in the table at the end of the list of alarms. **IMPORTANT: softening the water may worsen the problem!** | | | |
| | | 14. Conductivity probes short-circuited. | p. Clean them | | | |
| | | 15. Malfunction in the conductivity meter electrical circuit | q. Check the correct operation of the conductivity meter electrical circuit:<br>1. Check the electrical connections between the conductivity meter and the CP board: if necessary, restore the connection.<br>2. Replace the conductivity meter / fill tank.<br>3. Replace the CP board.<br>4. Replace the controller. | | | |
| | | | | | | |
| 6 short | Periodical wash active. **This is neither an alarm nor a warning: it is simply a signal that the periodical wash cycle is running.** | | | | | |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 short | Maintenance time expired.<br>This is displayed when: hour counter > bb (default 2000 hours). | 16. Maintenance time expired. | r. Replace /clean the cylinder, then set the hour counter to zero via RS485. | Warning | Resetting the hour counter via RS485 or dipswitch B1 | Energised steady or oscillating (energised for 10 seconds every 12 hours) depending on:<br>• Bit 7 of b1 (weight 128) = 0 => steady<br>• Bit 7 of b1 (weight 128) = 1 => oscillating<br>NOTE: the intermittent activation, even if enabled, is not performed if other alarms are active. |
| 8 short | Life timer expired. This is displayed when the hour counter> 1.5xbb (default 1.5x2000 = 3000 hours) | 17. Life timer expired. | s. Replace /clean the cylinder, then set the hour counter to zero with RS485. | Disable | Resetting the hour counter via RS485 or dipswitch B1. | Energised steady |
| 2 long | Cylinder depleted. The alarm is displayed when the cylinder is almost depleted - and production cannot satisfy demand within 3 hours from when the cylinder almost depleted warning is displayed.Note: the "Cylinder almost depleted" and "Cylinder depleted" warnings can be disabled by setting dipswitch B4 = ON. | 18. The cylinder is full of flakes. | t. Replace the cylinder. | Warning | Manual | Not active |
| 3 long | No supply water:the humidifier tries to add water but the level inside the cylinder does not increase to at the expected speed. The level of water is estimated by the TAM electrical circuit. | 19. Low supply pressure or no supply water. | u. The water supply pressure must be between 0.1 and 0.8 MPa (1-8 bar). | Disable | Automatic when the water supply returns (the supply is checked every 10 minutes by opening the fill valve and closing the contactor) | Active |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 20. Steam hose bent, choked or blocked by condensate: this may cause high backpressure that prevents the water from being filled into the cylinder (and thus would be drained directly). | v. Check and reposition/replace | | | |
| | | 21. Excessive backpressure in the hoses. | w. To check this, switch the unit off, remove the steam hose from the cylinder and switch the unit on: fill water into the cylinder, then reconnect the steam hose. See the manual for the static pressure allowed. Also check that the steam distributors upstream of the fan can be moved to achieve negative pressure (suction). | | | |
| | | 22. Internal fill hoses bent, choked or blocked | x. Check and reposition / clean/ replace | | | |
| | | 23. The drain valve leaks | y. Check and clean | | | |
| | | 24. Fill valve blocked or malfunctioning. | z. Check the correct operation of the fill valve:<br>1. Switch the unit off and on again: can the noise of the valve opening be heard?<br>i. YES: go to "2"<br>ii. NO: go to "3".<br>2. Clean/replace.If the internal flow limiter, installed at the valve outlet, is detached from the valve, the water may flow directly to the drain through the fill tank as the flow-rate is too high. If this is the case, replace the valve.<br>3. Replace the CP board. | | | |
| | | 25. TAM electrical circuit not configured correctly. | aa. Switch the unit off and configure the TAM jumper (CP1 & CP3) or the dipswitches B7-B8 (CP2 & CP4) following the instructions supplied with the CP. Switch the unit on and check if the alarm occurs again. | | | |
| | | 26. Malfunction in the TAM electrical circuit. | bb. Check the correct operation of the TAM circuit:1. Check the signal generated by the TAM: this must be between 0-2 Vac at the TAM terminals. 2. External TAM only. Check the correct connection between the TAM and the CP board: restore the connection if necessary.<br>3. Replace the TAM.<br>4. Replace the CP board. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 long | Low steam flow-rate during reduced production.The steam flow-rate is estimated by the TAM circuit. | 27. Conductivity of the mains water too low. | dd. The water conductivity must be between 125 and1250 µS/cm: bring the water within the limit values shown in the table at the end of the list of alarms. | Disable | Manual | Active |
| | | 28. Too much foam inside the cylinder. | ee. Clean the cylinder and re-start:<br>1. Switch the unit off;<br>2. Remove the jumper between ON-GND;<br>3. short-circuit DR-GND;<br>4. switch the unit on;<br>5. at the end of the drain cycle: switch the unit off, remove the jumper between DR-GND, short-circuit ON-GND, switch the unit on. | | | |
| | | 29. Excess lime scale inside the cylinder. | ff. Clean/replace the cylinder. | | | |
| | | 30. TAM electrical circuit not configured correctly. | gg. Refer to aa. | | | |
| | | 31. Malfunction in the TAM electrical circuit. | hh. Refer to bb. | | | |
| 5 long | | 32. Drain valve blocked / malfunctioning | ii. Check that the drain valve is working correctly:<br>1. Switch the unit off;<br>2. Remove the jumper between ON-GND;<br>3. short-circuit DR-GND;<br>4. switch the unit on;<br>5. can the noise of the drain valve opening be heard?<br>i. YES: remove the drain valve and clean the valve and the manifold<br>ii. NO: replace the valve. | | | |
| | | 33. Manifold blocked | jj. Remove the cylinder and the drain valve and clean the manifold. | | | |
| | | 34. Cylinder filter blocked | kk. Replace the cylinder. | | | |
| | | 35. TAM electrical circuit not configured correctly. | ll. Refer to aa | | | |
| | | 36. Malfunction in the TAM electrical circuit. | mm. Refer to bb. | | | |
| 6 long | User parameter error. | 37. The configuration parameters are corrupted. | nn. Download the correct configuration via humiSet.<br>oo. Replace the controller.<br>pp. If the problem persists, contact the CAREL service department. | Shut down | Manual | Active |
| 7 long | High conductivity of the supply water. The warning is displayed:<br>• After 1 hour if conductivity > b5 for more than 1 hour<br>• OR Immediately if conductivity > 3x b5 | 38. Parameter b5 too low (b5 = high water supply conductivity alarm threshold). | pp. If possible, set b5 to 1000 µS/cm via RS485 | Warning | Automatic display | Not active |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 39. Conductivity probes short-circuited. | qq. Clean them. | | | |
| | | 40. Water conductivity greater than b5. | rr. The conductivity of the water should be less than or equal to b5. **IMPORTANT: softening the water may worsen the problem!** | | | |
| 8 long | External control signal not connected correctly (2-10V only) | 41. Cable broken/disconnected/ not connected correctly. | ss. Check and connect correctly. | Disable | Automatic | Active |
| | | 42. Incorrect voltage of external control signal. | tt. If the CP board can be accessed via RS485:<br>1. set A0 =1<br>2. A2 = 0 for 0-1V external signal,<br>1 for 0-10V external signal,<br>2 for. 2-10V external signal | | | |
| 9 long | High water level without humidification demand.The alarm occurs if the water reaches the high level electrodes when the humidifier is shutdown or disabled (contactor open, fill & drain valves closed) | 43. Leaks from the fill valve. | uu. Check for any leaks from the fill valve and clean/replace | Disable | Automatic | Active |
| | | 44. High level sensor short-circuited. | vv. If possible, open the cylinder and clean it. | | | |
| | | 45. Malfunction of thehigh level sensor electrical circuit . | ww. Make sure the electrical connections between the sensor and the CP board are correct: reconnect if necessary.<br>xx. Replace the CP board. | | | |
| 10 long | Foam Foam | 46. Lubricants, solvents, detergents in the supply water (at times the water hoses are dirty after installation). | yy. Wash all water supply hoses thoroughly.<br>zz. The water conductivity must be between 125 and1250 µS/cm: bring the water within the limit values shown in the table at the end of the list of alarms. **IMPORTANT: softening the water may worsen the problem!** | | | |
| | | 47. Softened water. | aaa. The water conductivity must be between 125 and1250 µS/cm: bring the water within the limit values shown in the table at the end of the list of alarms. **IMPORTANT: softening the water may worsen the problem!** | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 48. High level sensor short-circuited. | bbb. If possible, open the cylinder and clean it. | | | |
| | | 49. Malfunction of the high level sensor electrical circuit. | ccc. Make sure the electrical connections between the sensor and the CP board are correct: reconnect if necessary. ddd. Replace the I/O board.eee. Replace the controller. | | | |
| 11 long | The cylinder requires maintenance due to the accumulation of lime scale. Note: the "Cylinder almost depleted" and "Cylinder depleted" warnings can be disabled by setting B4 = ON. | 50. The lime scale limits steam production. | fff. Routine maintenance: check the correct operation of the cylinder, clean it and, if necessary, replace it. | Warning | Manual | Not active |
| Only Via RS485 | Hour counter error | 51. Internal error in the hour counter or malfunction of the electrical connections. | ggg. Switch the unit off and on again. hhh. Replace the controller. iii. If the problem persists, contact the CAREL service department. | Warning | Via RS485 or dipswitch B1. | Not active |
| 9 short | Internal memory error | 52.The software or the configuration parameters are corrupted. | lll. Download the correct configuration via humiSet; replace the board. | Shut down | - | Active |

**Tab. 6**

## Current limits for the electrodes: with & without current peaks in the first 20s after the contactor closes

1- Param. b2=0 (default): phase current limits without current peaks in the first 20s after the contactor closes

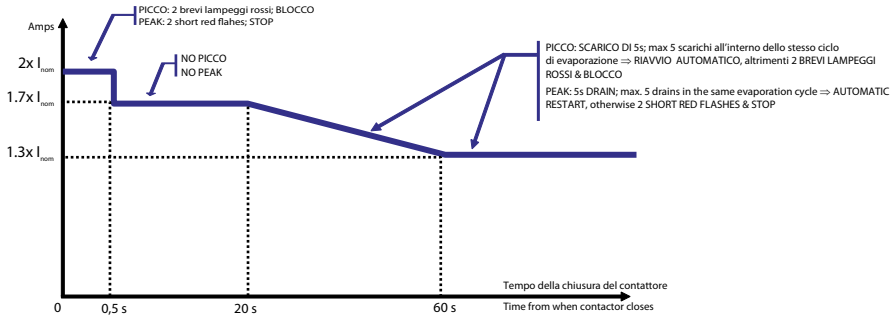

PICCO: 2 brevi lampeggi rossi; BLOCCO
PEAK: 2 short red flahes; STOP
Amps
2x I nom
1.7x I nom
1.3x I nom
NO PICCO
NO PEAK
PICCO: SCARICO DI 5s; max 5 scarichi all'interno dello stesso ciclo di evaporazione ⇒ RIAVVIO AUTOMATICO, altrimenti 2 BREVI LAMPEGGI ROSSI & BLOCCO
PEAK: 5s DRAIN; max. 5 drains in the same evaporation cycle ⇒ AUTOMATIC RESTART, otherwise 2 SHORT RED FLASHES & STOP
0
0,5 s
20 s
60 s
Tempo della chiusura del contattore
Time from when contactor closes

Fig. 8

2- Param. b2=0 (default): phase current limits <u>with</u> current peaks in the first 20s after the contactor closes.

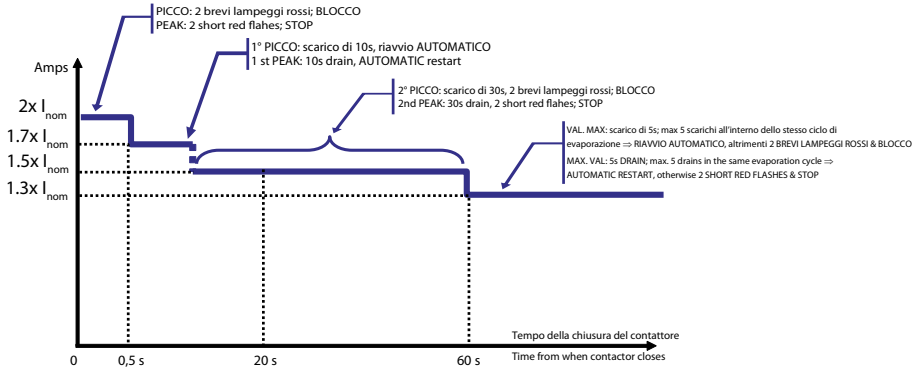

PICCO: 2 brevi lampeggi rossi; BLOCCO
PEAK: 2 short red flahes; STOP
1° PICCO: scarico di 10s, riavvio AUTOMATICO
1 st PEAK: 10s drain, AUTOMATIC restart
2° PICCO: scarico di 30s, 2 brevi lampeggi rossi; BLOCCO
2nd PEAK: 30s drain, 2 short red flahes; STOP
Amps
2x I nom
1.7x I nom
1.5x I nom
1.3x I nom
VAL. MAX: scarico di 5s; max 5 scarichi all'interno dello stesso ciclo di evaporazione ⇒ RIAVVIO AUTOMATICO, altrimenti 2 BREVI LAMPEGGI ROSSI & BLOCCO
MAX. VAL: 5s DRAIN; max. 5 drains in the same evaporation cycle ⇒ AUTOMATIC RESTART, otherwise 2 SHORT RED FLASHES & STOP
0
0,5 s
20 s
60 s
Tempo della chiusura del contattore
Time from when contactor closes

Fig. 9

## Current limits for the electrodes: with & without current peaks in the first 20s after the contactor closes

3- Param. b2>0:

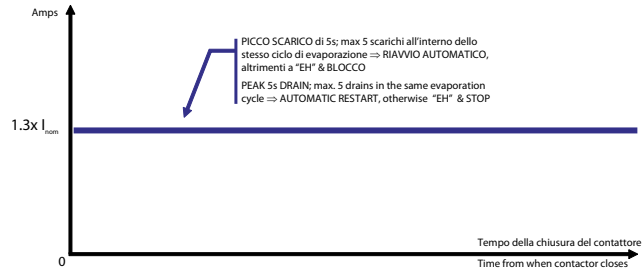

Amps
1.3x I nom
PICCO SCARICO di 5s; max 5 scarichi all'interno dello stesso ciclo di evaporazione ⇒ RIAVVIO AUTOMATICO, altrimenti a "EH" & BLOCCO
PEAK 5s DRAIN; max. 5 drains in the same evaporation cycle ⇒ AUTOMATIC RESTART, otherwise "EH" & STOP
0
Tempo della chiusura del contattore
Time from when contactor closes

Fig. 10

## SUPPLY WATER LIMIT VALUES

| limit values for normal supply water | | | | | Limits | |
|---|---|---|---|---|---|---|
| pH | pH | - | | | 7 | 8,5 |
| Specific conductivity @ 20°C | σ R, 20°C | - | µS/cm | | 300 | 1250 |
| Total hardness | TH | - | mg/l CaCO3 | | 100 (2) | 400 |
| Temporary hardness | | - | mg/l CaCO3 | | 60 (3) | 300 |
| TDS | TDS | - | mg/l | | (1) | (1) |
| Dry residue @ 180°C | R180 | - | mg/l | | (1) | (1) |
| Iron + Manganese | | - | mg/l Fe + Mn | | 0 | 0.2 |
| Chlorides | | - | ppm Cl- | | 0 | 30 |
| Silica | | - | mg/l SiO2 | | 0 | 20 |
| Chlorine | | - | mg/l Cl2 | | 0 | 0.2 |
| Calcium sulphate | | - | mg/l CaSO4 | | 0 | 100 |
| Metallic impurities | | - | mg/l | | 0 | 0 |
| Solvents, thinners , soaps, lubricants | | - | mg/l | | 0 | 0 |

**Tab. 7**

(1) Statistically: TDS ≅ 0.93 x $\sigma_{R,\ 20°}$ , $R_{180}$ = 0,66 x $\sigma_{R,\ 20°}$
(2) Content not less than 200% of the chlorides
(3) Content not less than 300% of the chlorides

| **limit values for supply water with a low salt content** | | | | | Limits | |
|---|---|---|---|---|---|---|
| **pH** | pH | - | | | 7 | 8,5 |
| **Specific conductivity @ 20°C** | σ R, 20°C | - | µS/cm | | 125 | 500 |
| **Total hardness** | TH | - | mg/l CaCO3 | | 50 (2) | 250 |
| Temporary hardness | | - | mg/l CaCO3 | | 30 (3) | 150 |
| TDS | TDS | - | mg/l | | (1) | (1) |
| Dry residue @ 180°C | R180 | - | mg/l | | (1) | (1) |
| Iron + Manganese | | - | mg/l Fe + Mn | | 0 | 0.2 |
| Chlorides | | - | ppm Cl- | | 0 | 20 |
| Silica | | - | mg/l SiO2 | | 0 | 20 |
| Chlorine | | - | mg/l Cl2 | | 0 | 0.2 |
| Calcium sulphate | | - | mg/l CaSO4 | | 0 | 60 |
| Metallic impurities | | - | mg/l | | 0 | 0 |
| Solvents, thinners , soaps, lubricants | | - | mg/l | | 0 | 0 |

**Tab. 8**

(1) Statistically: TDS ≅ 0.93 x $\sigma_{R,\ 20°}$ , $R_{180}$ = 0,66 x $\sigma_{R,\ 20°}$
(2) Content not less than 200% of the chlorides
(3) Content not less than 300% of the chlorides

## Diagrams

Steam production: yellow LED - Temporary production (“short flashes”)

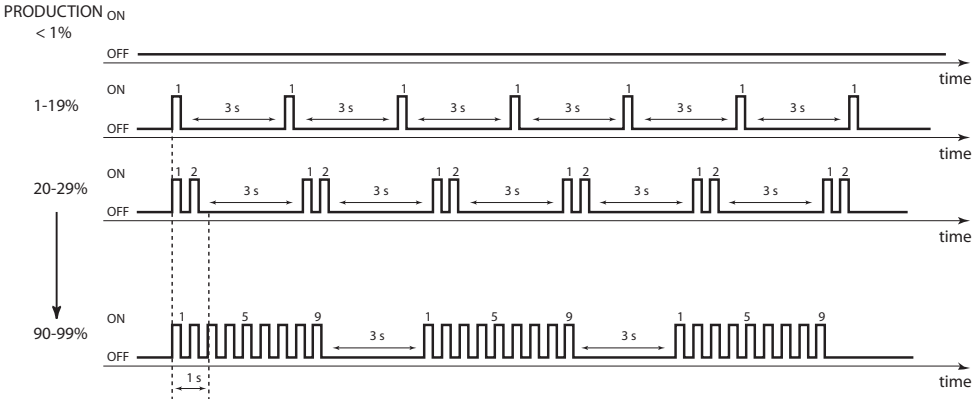



Fig. 11

Steam production: yellow LED - Steady production (“long flashes”)

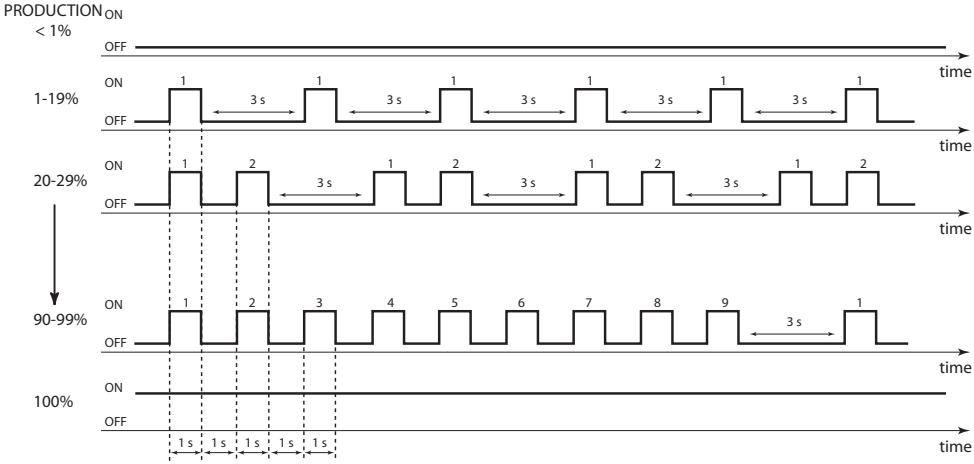



Fig. 12

The yellow LED is off when there is no steam production, while at 100% of rated production it remains on steady.

During temporary production, until steady production is reached, the yellow LED flashes at 2 Hz, as shown in diagram 1.

Once steady production has been reached, the yellow LED flashes at 0.5 Hz, as shown in diagram 2.

Each set of impulses is separated from the next by a 3 second pause to allow the user to count the number of impulses in each set: this shows the instant steam production.

## Alarms: red LED, “short flashes”

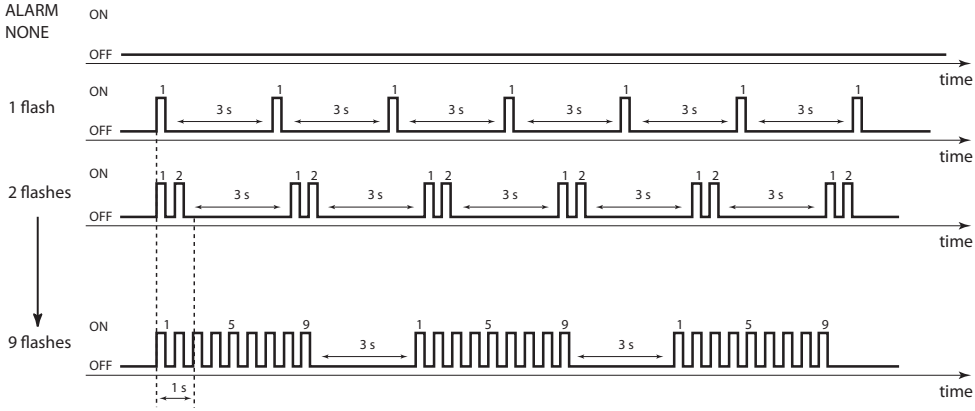



Fig. 13

## Alarms: red LED, “long flashes”

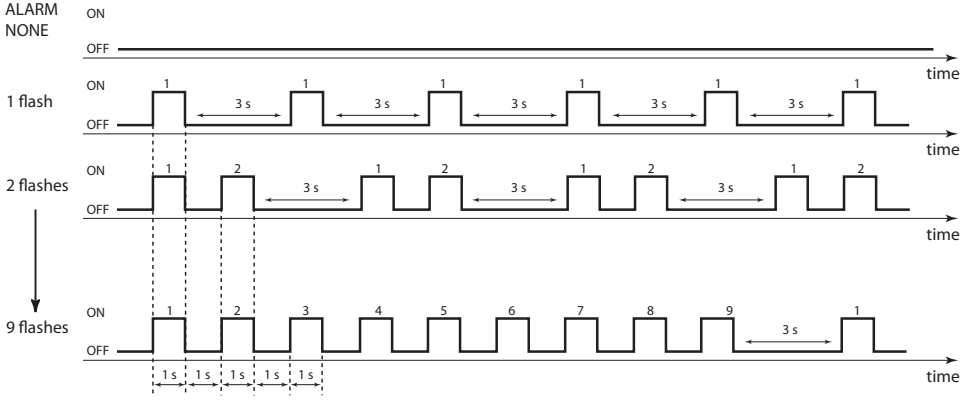



Fig. 14

**Note:**

CAREL

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+050003765 rel. 2.0 - 17.02.11

# OEM

ENG

# User manual

Manual version: 2.5 dated 02/02/11

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

READ CAREFULLY IN THE TEXT!

Integrated Control Solutions & Energy Savings

We wish to save you time and money!
We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

WARNING: separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.

# IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE APPLIANCE, PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS AND SAFETY REGULATIONS CONTAINED IN THIS MANUAL AND INDICATED ON THE LABELS ATTACHED TO THE UNIT.

INSTRUCTION SHEET +050003765 OF THE CP* CONTROL BOARD IS AN INTEGRAL PART OF THIS MANUAL!
CAREFULLY KEEP INSTRUCTION SHEET +050003765 TOGETHER WITH THIS MANUAL!

This humidifier produces non-pressurised steam by means of electrodes immersed in the water contained in the cylinder-boiler (hereafter referred to as the **cylinder**). The electrodes pass electric current through water, which, acting as electrical resistance, heats up. The steam produced is used to humidify rooms or industrial processes, by means of special distributors.
As the quality of the water in use affects the evaporation process, the appliance may be supplied with untreated water **as long as it is drinkable and not demineralised** (refer to supply water requirements); the evaporated water is automatically topped up using of a fill valve.
This appliance has been designed exclusively to humidify rooms directly or in ducts through a distribution system. Installation, use and maintenance shall be carried out according to the instructions contained in this manual.
**The environmental conditions and the power supply voltage must comply with the specified values.**
**Any other use and modification to the appliance not expressly authorised by the manufacturer shall be considered as improper.**
**Liability for injuries or damage caused by improper use lies exclusively with the user.**
**Please note that the unit contains live electrical devices and hot surfaces.**
**All service and/or maintenance operations must be carried out by specialist and qualified personnel aware of the necessary precautions and able to operate properly.**
**Disconnect the unit from the mains before accessing any internal parts.**
**The appliance must be installed in compliance with the local regulations in force.**
**The local safety regulations in force must be applied in all cases.**

**Disposal of the parts of the humidifier: the humidifier is made up of metal and plastic components. All these parts must be disposed of in compliance with the local legislation on waste disposal.**

**Materials warranty: 2 years (from the date of production, consumable parts excluded – e.g. the cylinder).**

**Certification:** the quality and safety of Carel's products are guaranteed by the **ISO 9001** certified design and production system, as well as by the mark.

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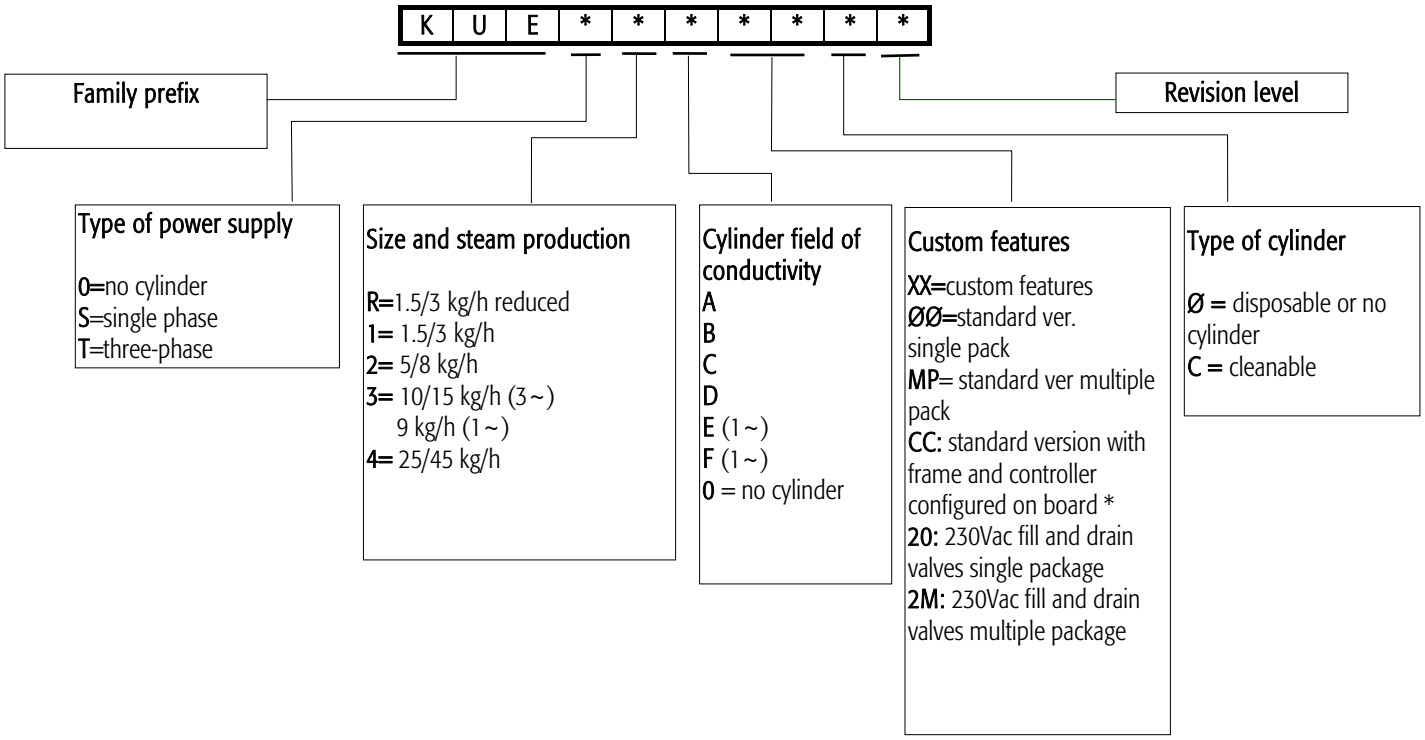
# 1. MODELS AND DESCRIPTION OF THE COMPONENTS

The code that identifies the model of humidifier is made up of 10 characters, with the following meaning:




* The controller is configured for the maximum capacity of the KUE selected and can be modified using humiSet.

**Example:**
KUET3C00C0 = OEM UE KIT with three-phase cylinder, cleanable, 15 kg/h steam, for standard conductivity, revision level 0;
KUE0R0MP00 = OEM UE KIT, reduced, 1.5/3 kg/h steam, no cylinder, multiple pack, revision level 0.
KUETR0CC00 = OEM UE KIT, reduced, three-phase, 1.5/3 kg/h steam, no cylinder, with frame and controller configured for 3 kg/h, 400 V three-phase.

## 1.1 Description of the components

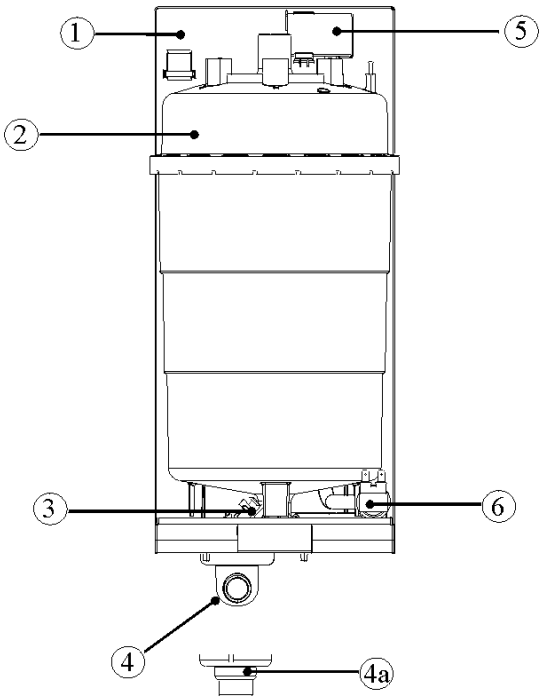



Fig. 1.a

| KUE*R / KUE*1 / KUE*2 / KUE*3 | |
|---|---|
| **no.** | **description** |
| 1 | Load-bearing frame |
| 2 | Cylinder |
| 3 | Drain solenoid valve |
| 4 | 90° revolving drain connector |
| 4a | Straight drain connector (supplied) |
| 5 | Supply tank + conductivity meter |
| 6 | Fill solenoid valve |

Table 1.a

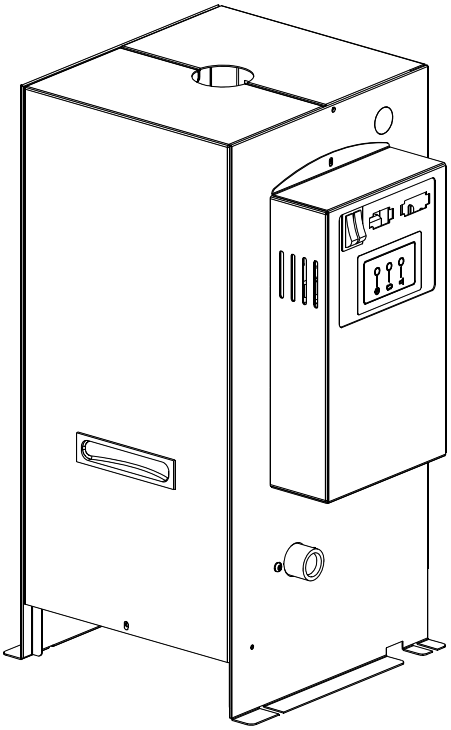


Fig. 1.b

| KUE***CC** | |
|---|---|
| no. | description |
| * | For the details of the components see Chap.3 |

Table 1.b

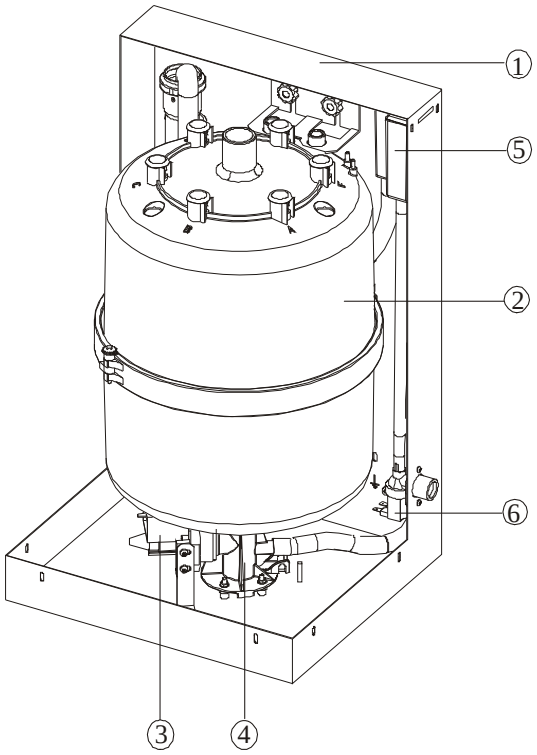
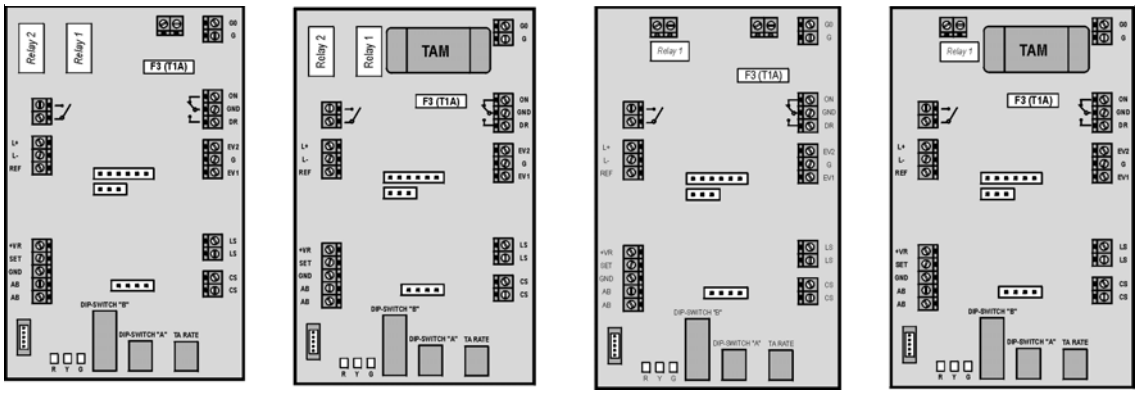



Fig. 1.c

| KUE*4 | |
|---|---|
| no. | description |
| 1 | Load-bearing frame |
| 2 | Cylinder |
| 3 | Drain pump |
| 4 | Supply/drain manifold |
| 5 | Supply tank + conductivity meter |
| 6 | Fill solenoid valve |

Table 1.c

CP1* CP2* CP3* CP4*




CP* control boards (also see instruction sheet +050003765 for the boards)

Fig. 1.d

Fig. 1.e

External TAM (current transformer) (required only for boards CP1* and CP3*)

Fig. 1.f refers to the following table for the description.

| no. | description |
|---|---|
| 1 | fill solenoid valve |
| 2 | flow limiter |
| 3 | supply hose |
| 4 | fill hose |
| 5 | overflow pipe |
| 6 | electrodes for measuring the conductivity |
| 7 | supply tank - overflow * |
| 8 | high level electrodes |
| 9 | steam outlet |
| 10 | electrodes (2/6 in the single-phase model, 3/6 in the three-phase model) |
| 11 | cylinder casing |
| 12 | bottom filters |
| 13 | drain solenoid valve |
| 14 | corrugated drain pipe |
| 15 | drain column |
| 16 | drain pump |

Table 1.d

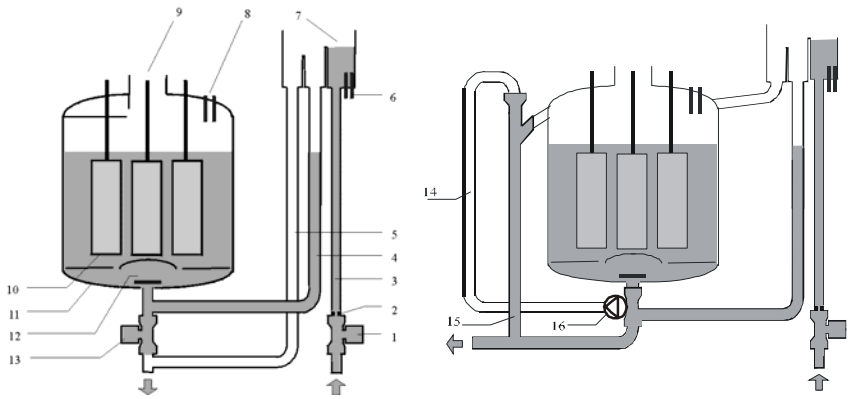



Fig. 1.f

* Device used to prevent the water in the supply tank from exceeding the safety level (for example due to a malfunction of the controller or leaks from the fill solenoid valve, or back pressure). The supply tank is fitted with an overflow diaphragm that releases the excess water introduced, draining it through a special pipe.
The overflow diaphragm is below the fill to prevent backflow into the supply hose.

# 2. INSTALLATION: DIMENSIONS, WEIGHTS, HOSE CONNECTIONS

## 2.1 Positioning

- To favour steam distribution, position the appliance so as to minimise the length of the steam outlet pipe (max 4 m). The unit has been designed for wall mounting; the wall must be able to support the weight of the unit during operation.
- The cylinder of the humidifier may reach temperatures above 60°C.
- Make sure that the humidifier is level.

KUE*R / KUE*1 / KUE*2 / KUE*3

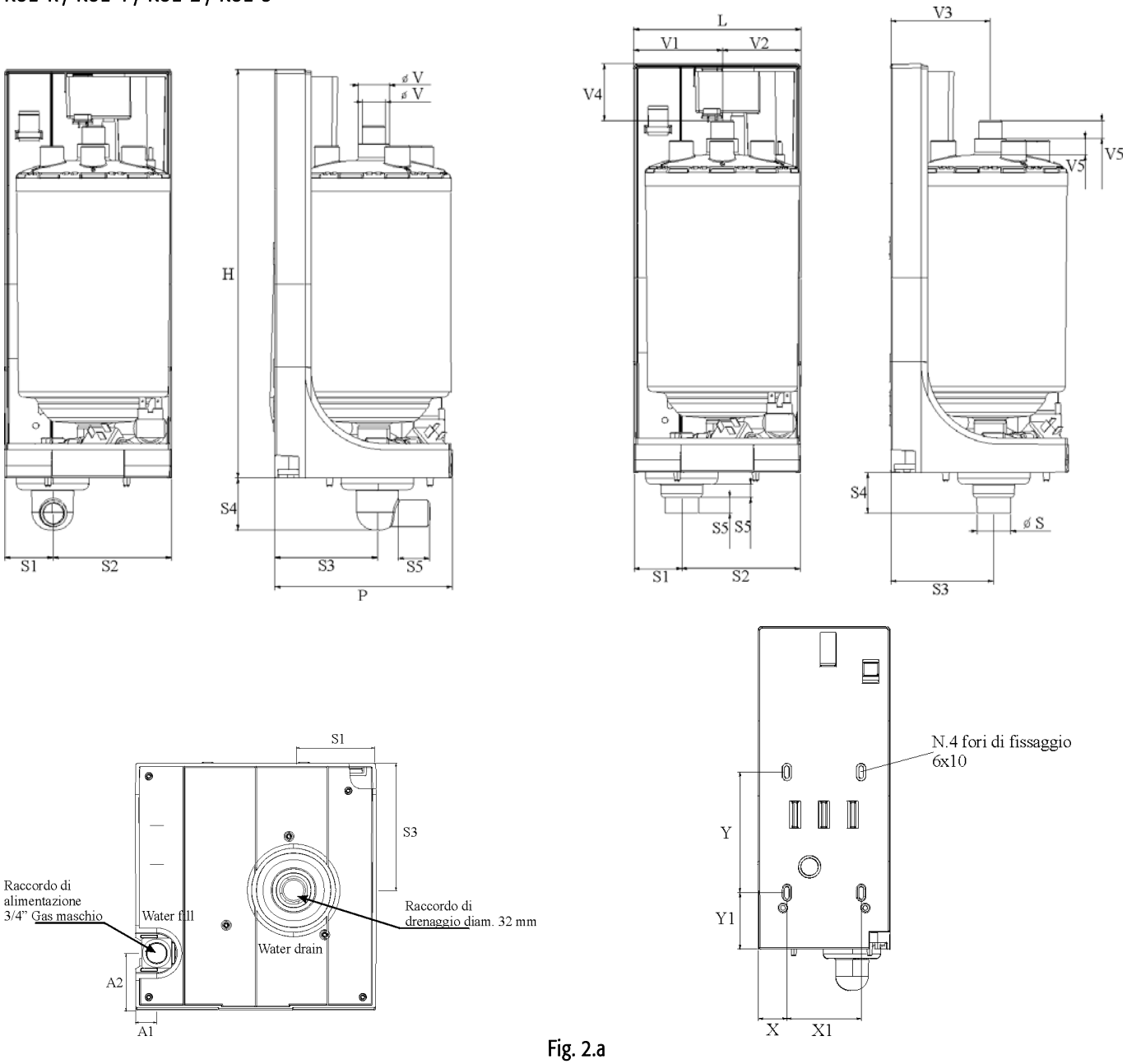



Fig. 2.a

| Italian | *English* |
|---|---|
| Raccordo di alimentazione 3/4 " Gas maschio | *Supply connection 3/4" Gas male* |
| Raccordo di drenaggio diam. 32 mm | *Drain connector dia. 32mm* |
| N. 4 fori di fissaggio 6x10 | *4 fastening holes 6x10* |

KUE*4

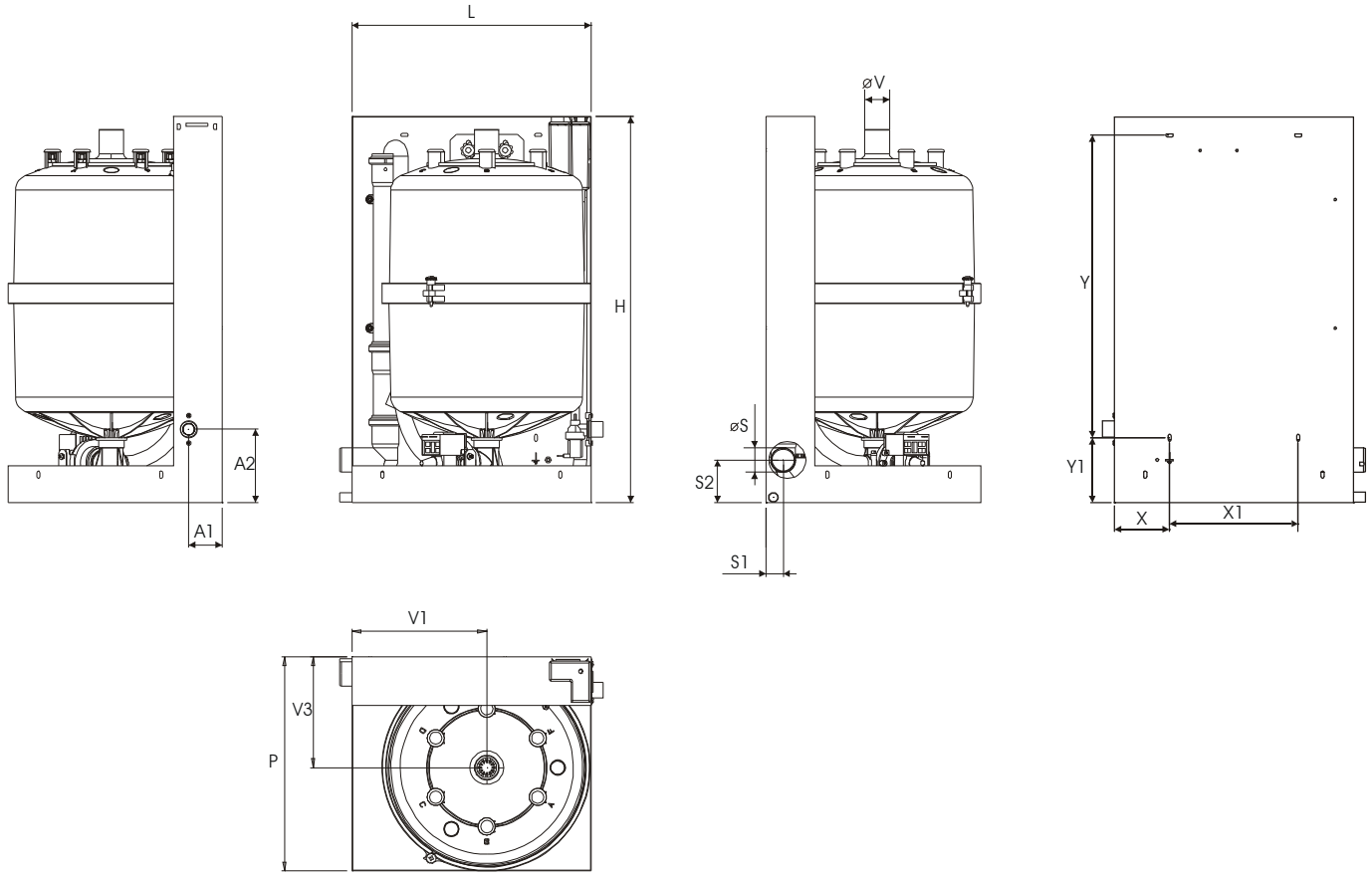



Fig. 2.b

KUE***CC**

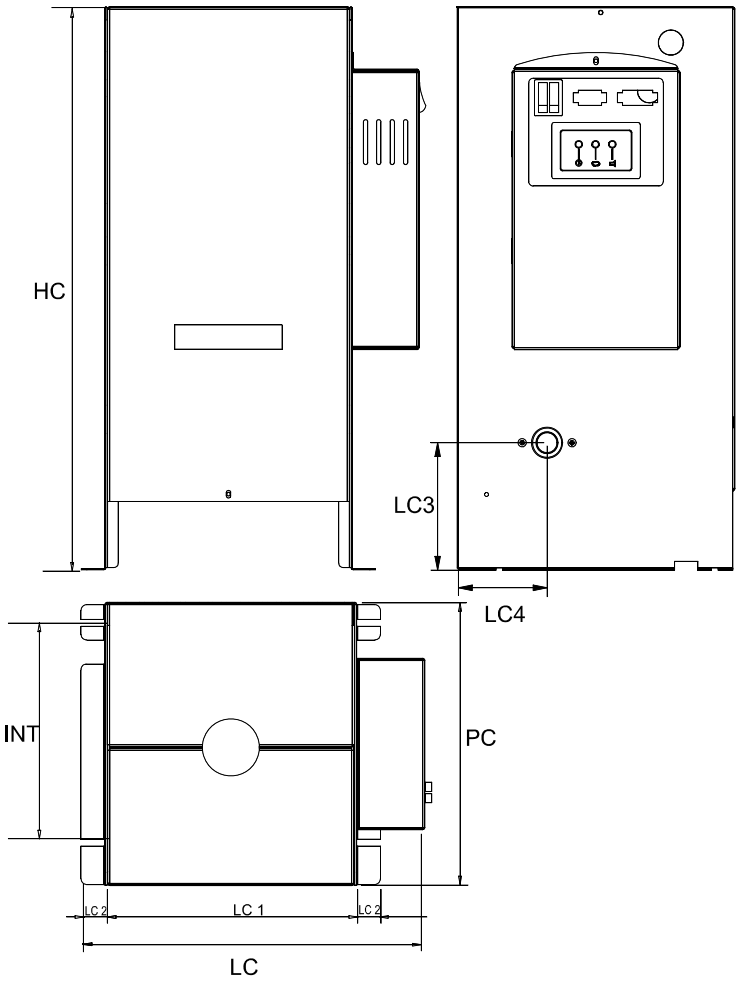



Fig. 2.c

| | | models | | | | |
|---|---|---|---|---|---|---|
| | | KUE*R* | KUE*1* | KUE*2* | KUE*3* | KUE*4* |
| Weights ( kg ) | Empty | 1,2 | 1,6 | 2,9 | 3,5 | 7,2 |
| | Packaged | 2,0 | 2,4 | 3,7 | 4,3 | 8,9 |
| | Installed | 3,7 | 5,5 | 8,9 | 13,8 | 39 |
| | Installed + frame | 7,7 | 10 | 14,3 | 21 | |
| Dimensions (mm) | H | 300 | 391 | 412 | 511 | 630 |
| | L without cylinder | 160 | 160 | 185 | 225 | 390 |
| | L with cylinder [1] | 160 | 160 | 204 | 260 | |
| | P without cylinder | 170 | 170 | 220 | 230 | 350 |
| | P with cylinder [1] | 175 | 175 | 230 | 268 | |
| | Ø V | 23-30 | 23-30 | 31 | 31 | 40 |
| | Ø S | 32 | 32 | 32 | 32 | 40 |
| | V1 | 81 | 82 | 93 | 113 | 220 |
| | V2 | 79 | 78 | 92 | 112 | |
| | V3 | 99 | 99 | 124 | 135 | 181 |
| | V4 | 54 | 54 | 20 | 26 | |
| | V5 | 16-17 | 16-17 | 37 | 37 | |
| | S1 | 45 | 46 | 54 | 77 | 28 |
| | S2 | 114 | 114 | 131 | 148 | 70 |
| | S3 | 110 | 110 | 120 | 118 | |
| Hose connection | S4 | 40-50 | 40-50 | 40-50 | 40-50 | |
| | S5 | 13-15-30 | 13-15-30 | 13-15-30 | 13-15-30 | |
| Mounting distances | A1 | 19,5 | 19,5 | 19,5 | 19,5 | 55 |
| | A2 | 53 | 53 | 53 | 53 | 120 |
| | X | 35 | 35 | 47 | 68 | 90 |
| | X1 | 90 | 90 | 90 | 90 | 210 |
| Dimensions of the frame (mm) | Y | 146 | 146 | 213 | 288 | 494 |
| | Y1 | 68 | 68 | 69 | 69 | 106 |
| | HC | 380 | 470 | 490 | 590 | |
| | LC | 277 | 277 | 302 | 354 | |
| | LC1 | 196 | 196 | 221 | 273 | |
| | LC2 | 21 | 21 | 21 | 21 | |
| | LC3 | 56.5 | 115 | 115 | 115 | |
| | LC4 | 80 | 80 | 80 | 80 | |
| | PC | 198 | 198 | 248 | 260 | |
| | INT | 142.3 | 142.3 | 192.3 | 204.3 | |

Tab. 2.a

[1] Maximum dimensions with cylinder.

The appliance can be either wall-mounted by using the appropriate fastening holes or installed on bracket so that the water connections can be completed.

## 2.2 Connecting the hoses

The installation of the humidifier requires the connection to the water supply and drain hoses.

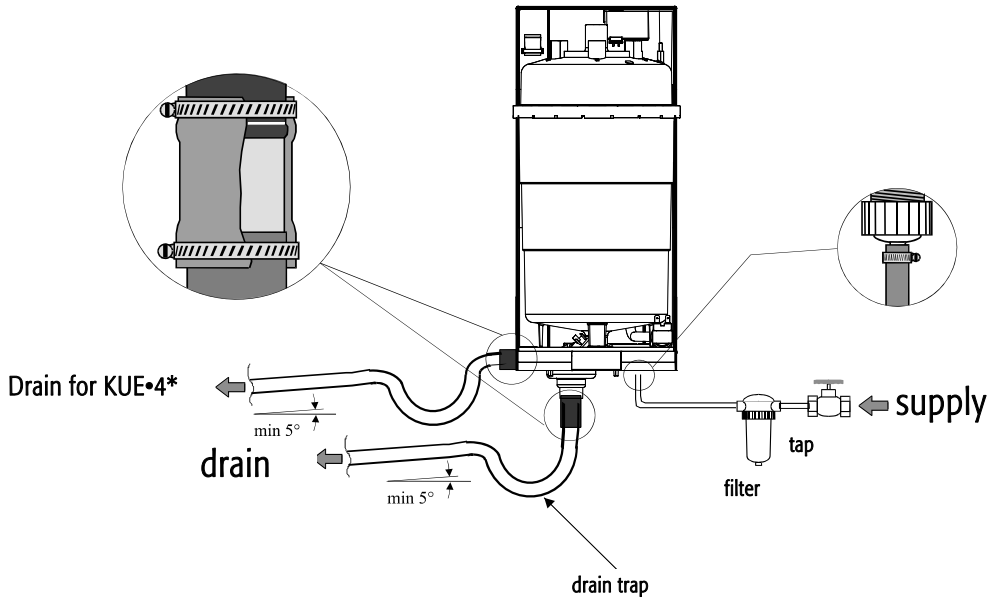



Fig. 2.d

## 2.3 Drain

| | models | | | | |
|---|---|---|---|---|---|
| | KUE*R* | KUE*1* | KUE*2* | KUE*3* | KUE*4* |
| Max. instant drain flow l/min | ~ 4 | ~ 4 | ~ 4 | ~ 4 | ~ 22.5 |
| Darin water attachment (mm) | 32 | 32 | 32 | 32 | 40 |
| Min. ID of the drain hose | 25 | 25 | 25 | 25 | 36 |

Tab. 2.b

## 2.4 Supply

| | models | | | | |
|---|---|---|---|---|---|
| | KUE*R* | KUE*1* | KUE*2* | KUE*3* | KUE*4* |
| Max. instant supply flow l/min | 0.6 | 0.6 | 0.6 | 1.2 | 4 |
| Supply water attachment | ¾ "G Male | ¾ "G Male | ¾ "G Male | ¾ "G Male | ¾ "G Male |
| Min. ID of the sill pipe or hose | 6 | 6 | 6 | 6 | 6 |

Tab. 2.c

To simplify installation, it is recommended to use the CAREL hose with an inside diameter of 6 mm and an outside diameter of 8 mm (code 1312350APN) and the revolving ¾G connection, either straight (code 9995727ACA) or 90° (code 9995728ACA), available upon request.

A shut-off tap and a mechanical filter should be installed to trap any solid impurities.

The drain water is connected using a section of rubber or plastic hose resistant to 100°C, with a recommended inside diameter of 32 mm or 40 mm for the 25 to 45kg/h models (compliant with DIN 19535, UNI 8451/8452).
The drain connector is suitable for heat sealing with polypropylene drain pipes.

IMPORTANT WARNING: the drain hose must be free, without backpressure and with a drain trap immediately downstream of the connection to the humidifier.

## 2.5 Checks

The following conditions represent correct water connection:

- installation of a shut-off tap in the supply water line;
- presence of a mechanical filter in the supply water line;
- water temperature and pressure within the allowed values;
- drain hose resistant to temperatures of 100°C;
- minimum inside diameter of the drain hose of 25 mm or 36 mm for the 25 to 45kg/h models;
- minimum slope of the drain hose greater than or equal to 5°;
- electrically non-conductive sleeve.
- presence of a drain trap in the drain hose

IMPORTANT WARNING: when installation is completed, flush the supply hose for around 30 minutes by piping the water directly into the drain without sending it into the humidifier. This will eliminate any scale or processing residues that may block the fill valve or cause foam when boiling.

## 2.6 Installation of the steam hose and condensate return hose

- The connection between humidifier and distributor must be made using a pipe suitable for this purpose, such as the CAREL hose.
- Avoid the formation of pockets or traps where the condensate may accumulate.
- Make sure that the hose is not choked due to tight curves or twisting.
- Fasten the ends of the hose with screw clamps.

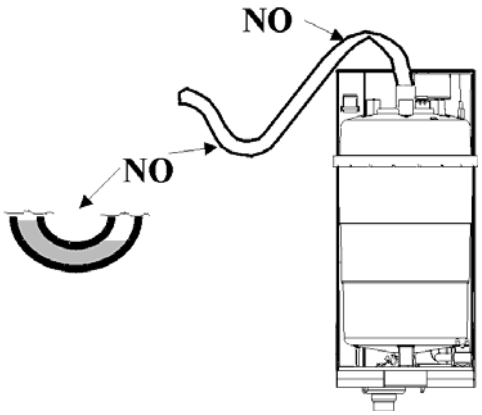



Fig. 2.e

The pipe may run according to either of the two following solutions:

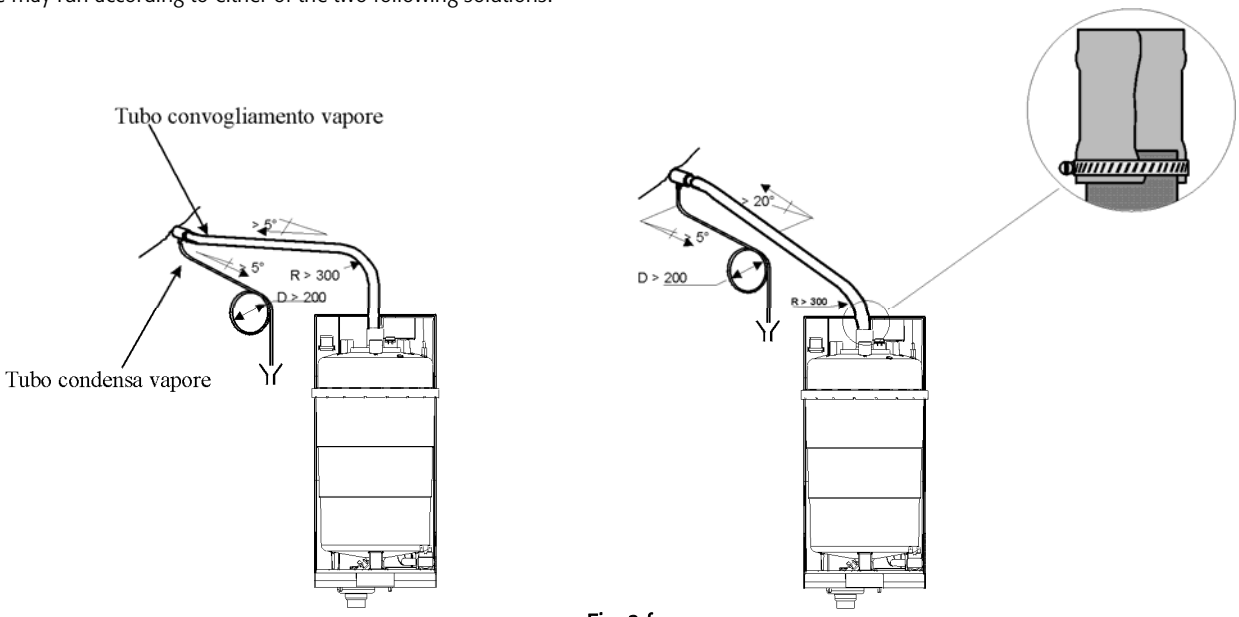



Fig. 2.f

| Italian | *English* |
|---|---|
| Tubo convoglimento vapore | |
| Tubo condenza vapore | |

IMPORTANT WARNING: the length of the steam pipe should not exceed 4 m.
To allow the drain trap in the steam condensate hose to operate properly, it must be filled with water before starting the humidifier.

## 2.7 Characteristics of the water

### 2.7.1 Supply water

The humidifier must be supplied with mains water, wit the following characteristics:

- pressure between 0.1 and 0.8 MPa (1 to 8 bar, 14.5 to 116 psi);
- temperature between 1 and 40 °C;
- instant flow rate not lower than the rated fill solenoid valve flow rate (refer to table 2.4.1);
- connection type ¾"G male.

LIMIT VALUES FOR THE SUPPLY WATER WITH MEDIUM-HIGH CONDUCTIVITY IN AN IMMERSED ELECTRODE HUMIDIFIER

| | | | | LIMITS Min | LIMITS Max |
|---|---|---|---|---|---|
| Hydrogen ions | pH | - | | 7 | 8.5 |
| Specific conductivity at 20°C | $\sigma_{R\ 20°C}$ | - | µS/cm | 300 | 1250 |
| Total dissolved solids | TDS | - | mg/l | (1) | (1) |
| Dry residue at 180°C | $R_{180}$ | - | mg/l | (1) | (1) |
| Total hardness | TH | - | mg/l $CaCO_3$ | 100(2) | 400 |
| Temporary hardness | | - | mg/l $CaCO_3$ | 60(3) | 300 |
| Iron + Manganese | | - | mg/l Fe + Mn | 0 | 0.2 |
| Chlorides | | - | ppm Cl | 0 | 30 |
| Silica | | - | mg/l $SiO_2$ | 0 | 20 |
| Residual chlorine | | - | mg/l $Cl^-$ | 0 | 0.2 |
| Calcium sulphate | | - | mg/l $CaSO_4$ | 0 | 100 |
| Metallic impurities | | - | mg/l | 0 | 0 |
| Solvents, diluents, soaps, lubricants | | - | mg/l | 0 | 0 |

Tab. 2.d

(1) Values depending on specific conductivity; in general: TDS ≅ 0.93 * $\sigma_{20;}$ $R_{180}$ ≅ 0.65 * $\sigma_{20}$
(2) not lower than 200% of the chloride content in mg/l of $Cl^-$
(3) not lower than 300% of the chloride content in mg/l of $Cl^-$

LIMIT VALUES FOR THE SUPPLY WATER WITH MEDIUM-LOW CONDUCTIVITY IN AN IMMERSED ELECTRODE HUMIDIFIER

| | | | | LIMITS Min | LIMITS Max |
|---|---|---|---|---|---|
| Hydrogen ions | pH | - | | 7 | 8.5 |
| Specific conductivity at 20°C | $\sigma_{R\ 20°C}$ | - | µS/cm | 125 | 500 |
| Total dissolved solids | TDS | - | mg/l | (1) | (1) |
| Dry residue at 180°C | $R_{180}$ | - | mg/l | (1) | (1) |
| Total hardness | TH | - | mg/l $CaCO_3$ | 50(2) | 250 |
| Temporary hardness | | - | mg/l $CaCO_3$ | 30(3) | 150 |
| Iron + Manganese | | - | mg/l Fe + Mn | 0 | 0.2 |
| Chlorides | | - | ppm Cl | 0 | 20 |
| Silica | | - | mg/l $SiO_2$ | 0 | 20 |
| Residual chlorine | | - | mg/l $Cl^-$ | 0 | 0.2 |
| Calcium sulphate | | - | mg/l $CaSO_4$ | 0 | 60 |
| Metallic impurities | | - | mg/l | 0 | 0 |
| Solvents, diluents, soaps, lubricants | | - | mg/l | 0 | 0 |

Tab. 2.e

(1) Values depending on specific conductivity; in general: TDS ≅ 0.93 * $\sigma_{20;}$ $R_{180}$ ≅ 0.65 * $\sigma_{20}$
(2) not lower than 200% of the chloride content in mg/l of $Cl^-$
(3) not lower than 300% of the chloride content in mg/l of $Cl^-$

**Warning**: no relation can be demonstrated between water hardness and conductivity.

IMPORTANT WARNING: **do not treat water with softeners!** This could cause corrosion of the electrodes or the formation of foam, leading to potential operating problems or failures.

**Avoid:**

1. using well water, industrial water or water drawn from cooling circuits; in general, avoid using potentially contaminated water, either from a chemical or bacteriological point of view;
2. adding disinfectants or corrosion inhibiters to water, as these substances are potentially irritant.

## 2.8 Drain water

Inside the humidifier the water boils and is transformed into steam, without the addition of any substances. The drain water, as a result, contains the same substances that are dissolved in the supply water, yet in greater quantities, depending on the concentration in the supply water and the set draining cycles, and **may reach temperatures of 100°C**. Not being toxic, it may be drained into the sewage system. The drain connector has an external diameter of 32 mm.

# 3. OEM WITH FRAME (only 24Vac fill and drain valves or with 24Vac fill valve and 230Vac drain pump)

## 3.1 Introduction

This is a special OEM version fitted on a frame, with a pre-wired control board, switch and drain button.

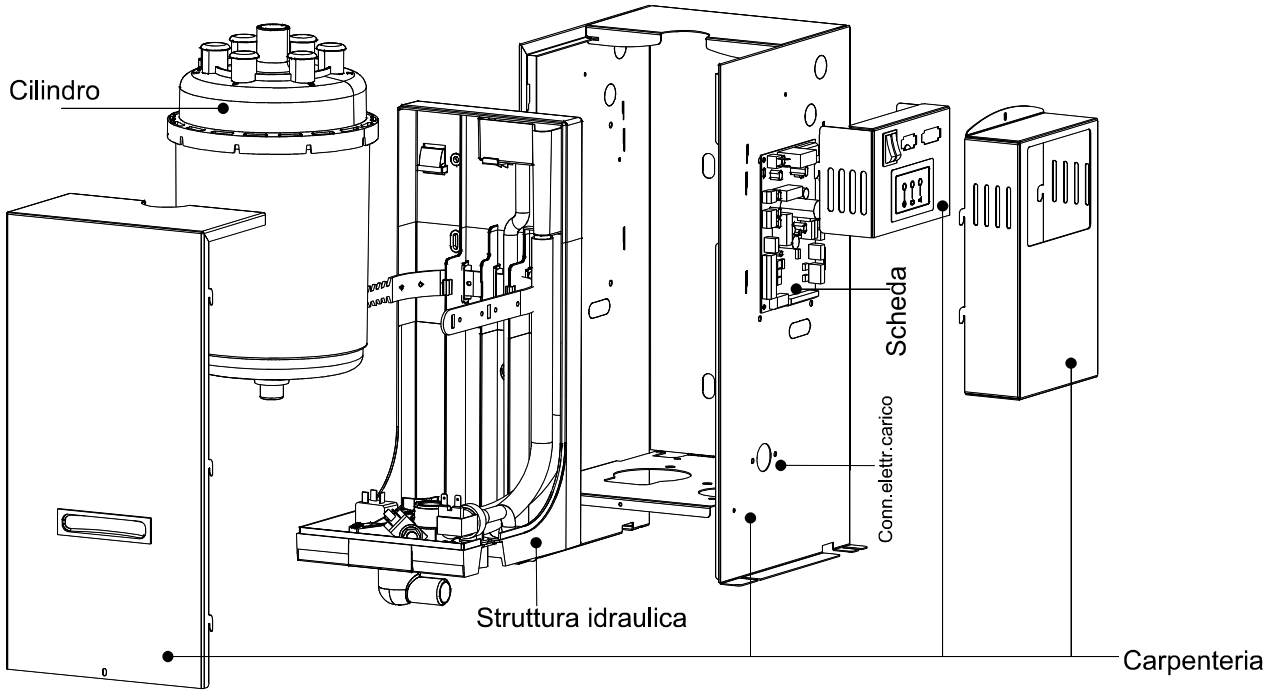



Fig. 3.a

| Italian | *English* |
|---|---|
| Cilindro | *Cylinder* |
| Struttura idraulica | *Water circuit support structure* |
| Conn. elett. carico | *Fill elect. conn.* |
| Scheda | *Board* |
| Carpenteria | *Frame* |

## 3.2 Frame

The humidifiers are supplied with a compact, openable, hot galvanised metal frame, complete with handle and screw closing. The frame includes a case for housing the control board

## 3.3 Control board

The controller used for these OEM units is the CP4 with microprocessor, complete with software for immersed electrode humidifiers:
- Type of configuration, ON/OFF or 0 to 10 V proportional;
- Built-in current sensor;
- 24 Vac power supply;
- AFS antifoam algorithm;
- Possibility of remote ON/OFF (AB-AB);
- Outputs: 1 x 250 Vac relay, 5 Amp (2 Amp) for electrode power supply;
- 1 x 250 Vac relay, 5 Amp (2 Amp) for alarm output;
- Possibility of RS485 serial connection (optional TACP485000);
-Can be configured using the HUMISET000 programming kit.

## 3.4 Water fill

The fill solenoid valve with ¾"G male connector is located on the right side of the frame, with the measurements shown in table 2.1.1 (LC3, LC4), so as to make this accessible for cleaning the filter on the solenoid valve when the unit is installed.

## 3.5 Drain

Drain assembly made up of a manifold and drain solenoid valve with 90° connector and 32 mm diameter fitting, with the possibility to replace the drain with a straight pipe, supplied.

## 3.6 Water circuit

Water circuit with supply tank plus conductivity meter and cylinder fill, drain and overflow hoses.

## 3.7 Structure

Back made from polypropylene reinforced with fibreglass, cylinder secured by convenient strap closing system.

## 3.8 Switch and manual drain button

The humidifier is fitted with a switch from turning the unit on/off and a button for the manual drain function.

## 3.9 External connections

The unit can be managed externally via 2 connectors:

- a four pin connector used to control a phase of the power supply to the external power contactor coil (terminals 1,2) and for the 24 Vac power supply to the auxiliary circuits (terminals 3, 4);
- the second 3 pin connector is used for the connection to the probe (see diagram 4.7).

## 3.10 Power cable

The power cable is 3 metres long, is flame retardant and is supplied with a rubber cable gland. One end has special cable terminals for connection to the cylinder, and the other end is free.

## 3.11 Current transformer (TAM)

This is fitted on the control board, and monitors one of the phases of the power supply to measure the current.

## 3.12 LED panel

The operation the humidifier is displayed using a panel fitted with coloured LEDs, with the following meanings
green: power present
yellow: steam production in progress
red: alarm signal
These events are indicated by sequences of flashes; for the meanings see the instruction sheet +050003765.

## 3.13 Technical specifications

Steam production, weights and dimensions see Chap. 2.
The index of protection is IP20.

# 4. ELECTRICAL CONNECTIONS (WITH CAREL CONTROLLER, MODEL CP)

**Before making the connections, make sure that the unit is disconnected from the mains power supply.** For further information on the controller, refer to the corresponding instruction sheet.

## 4.1 Single-phase wiring diagram, EXTERNAL TAM (CP1 *)

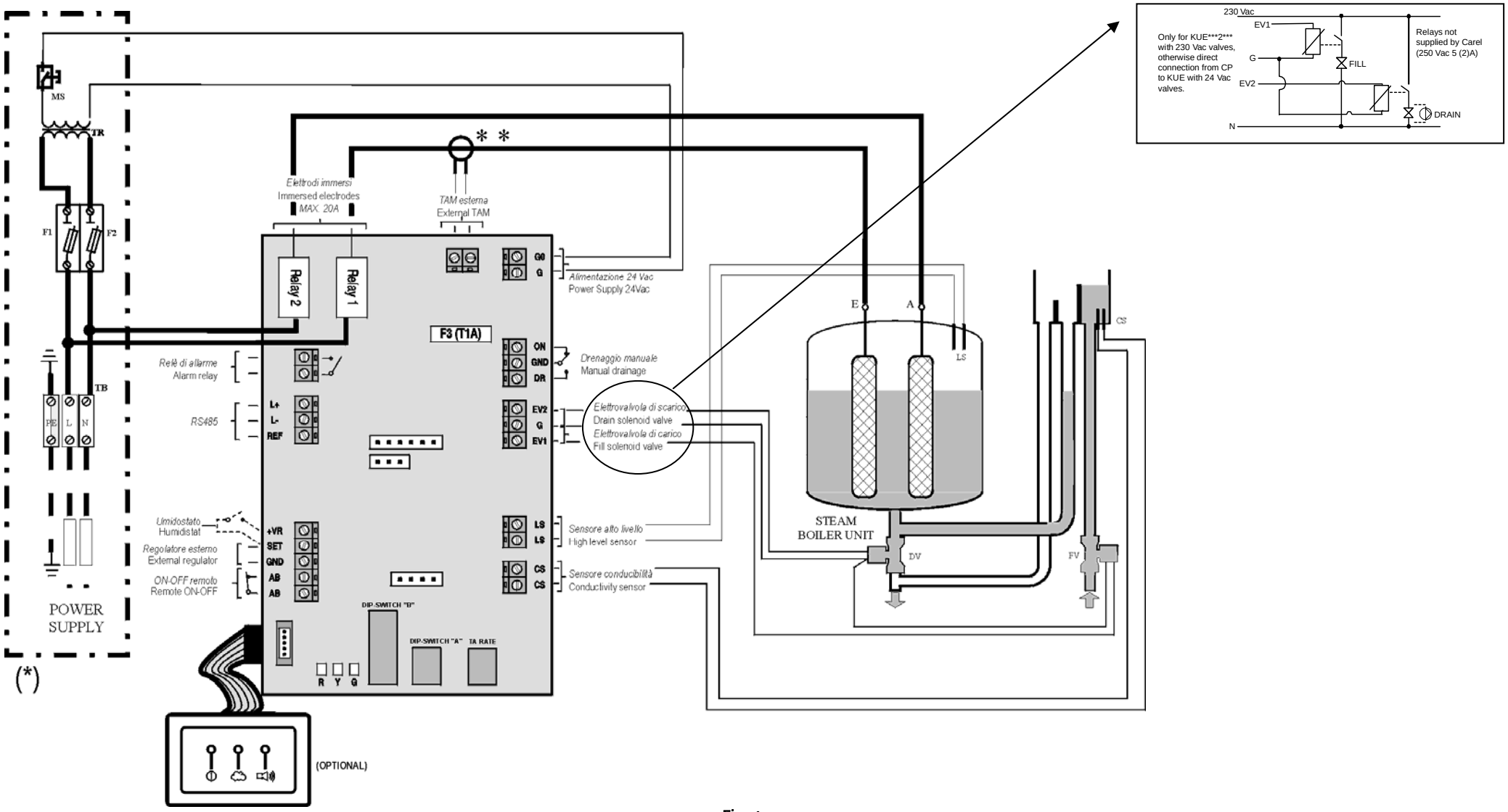



Fig. 4.a

(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.2 Single-phase wiring diagram, INTERNAL TAM (CP2 *)

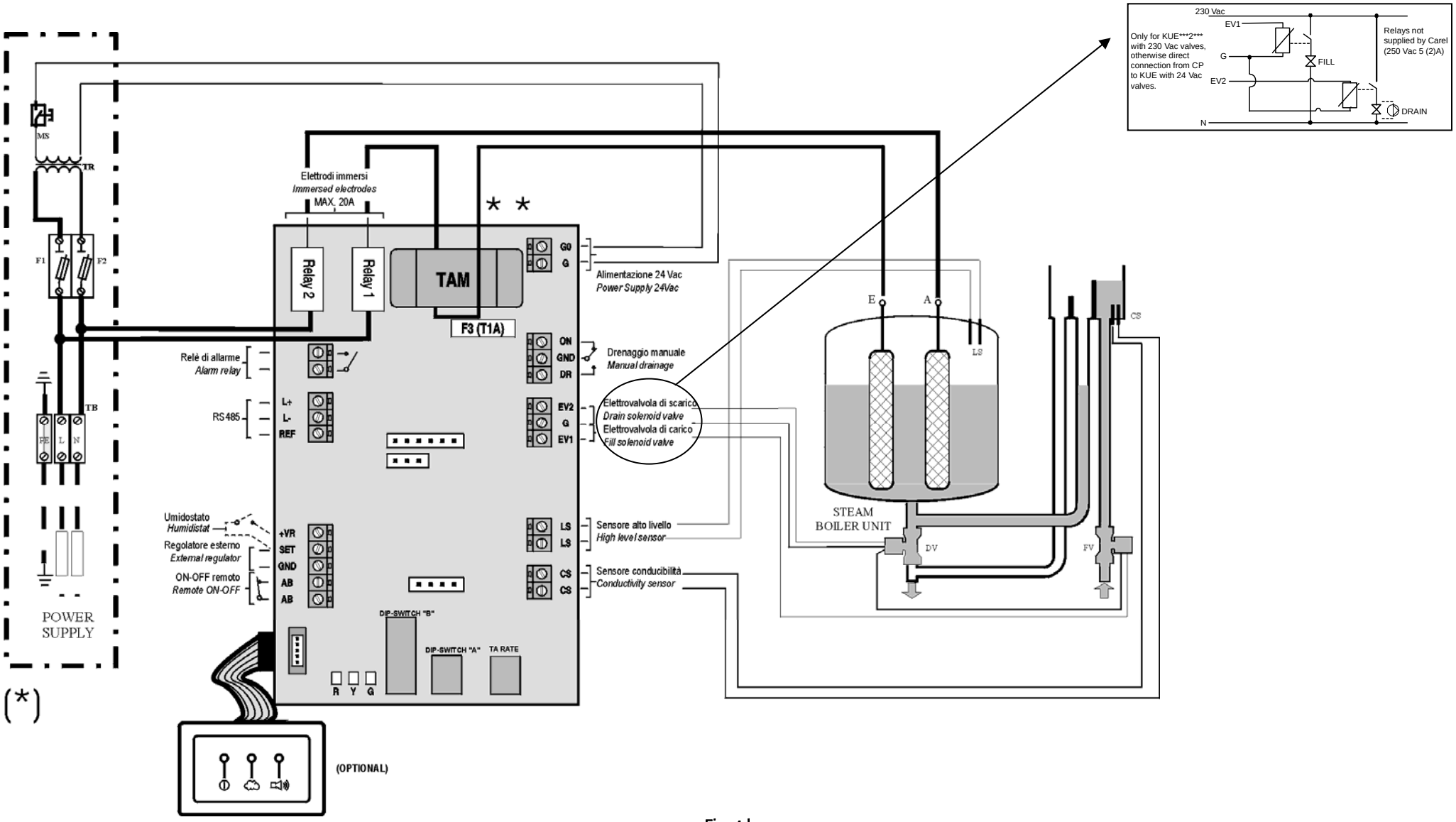



Fig. 4.b

(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.3 Single-phase wiring diagram, INTERNAL TAM with contactor (CP4 *)

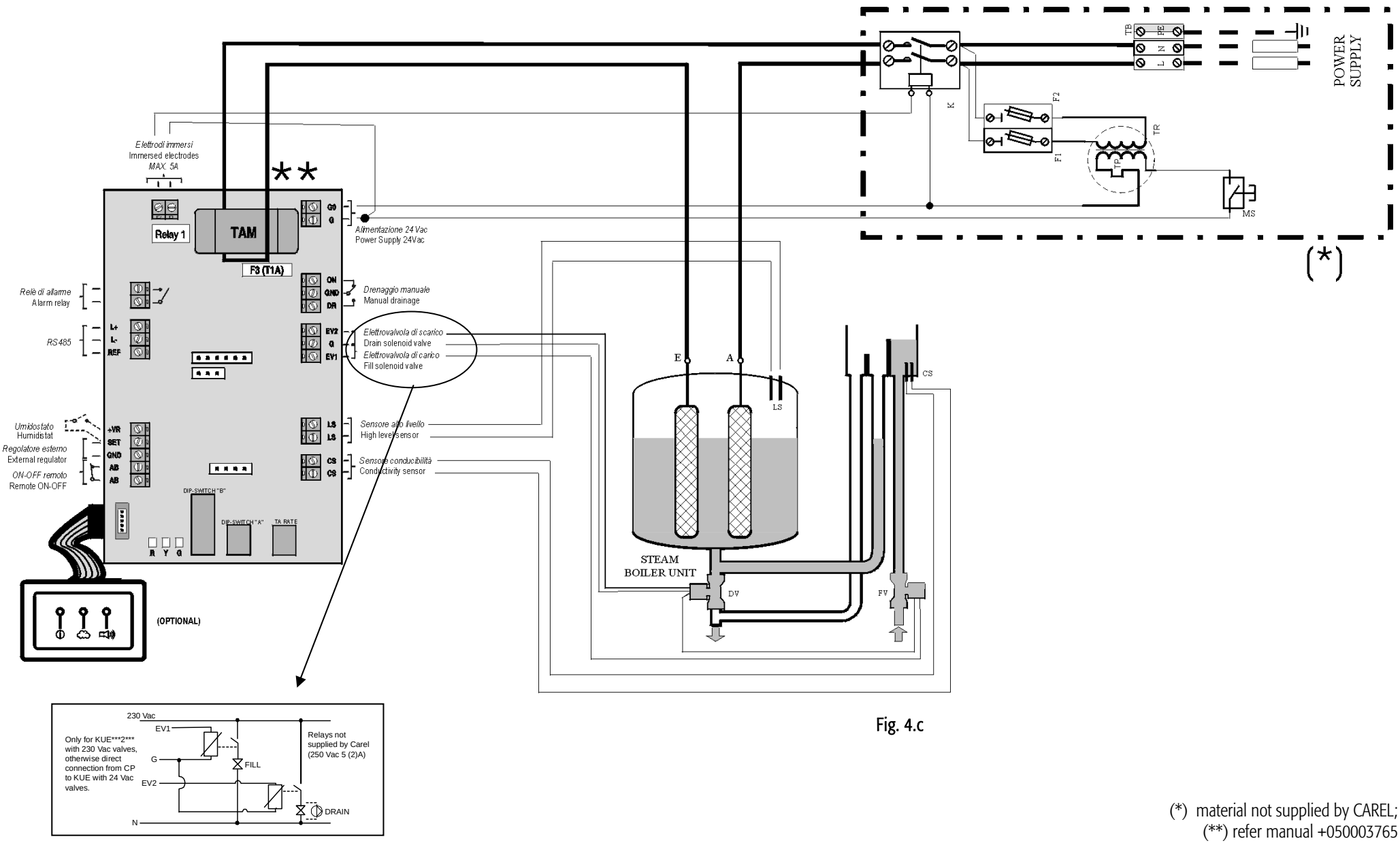



Fig. 4.c

(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.4 Single-phase wiring diagram, EXTERNAL TAM with contactor (CP3 *)

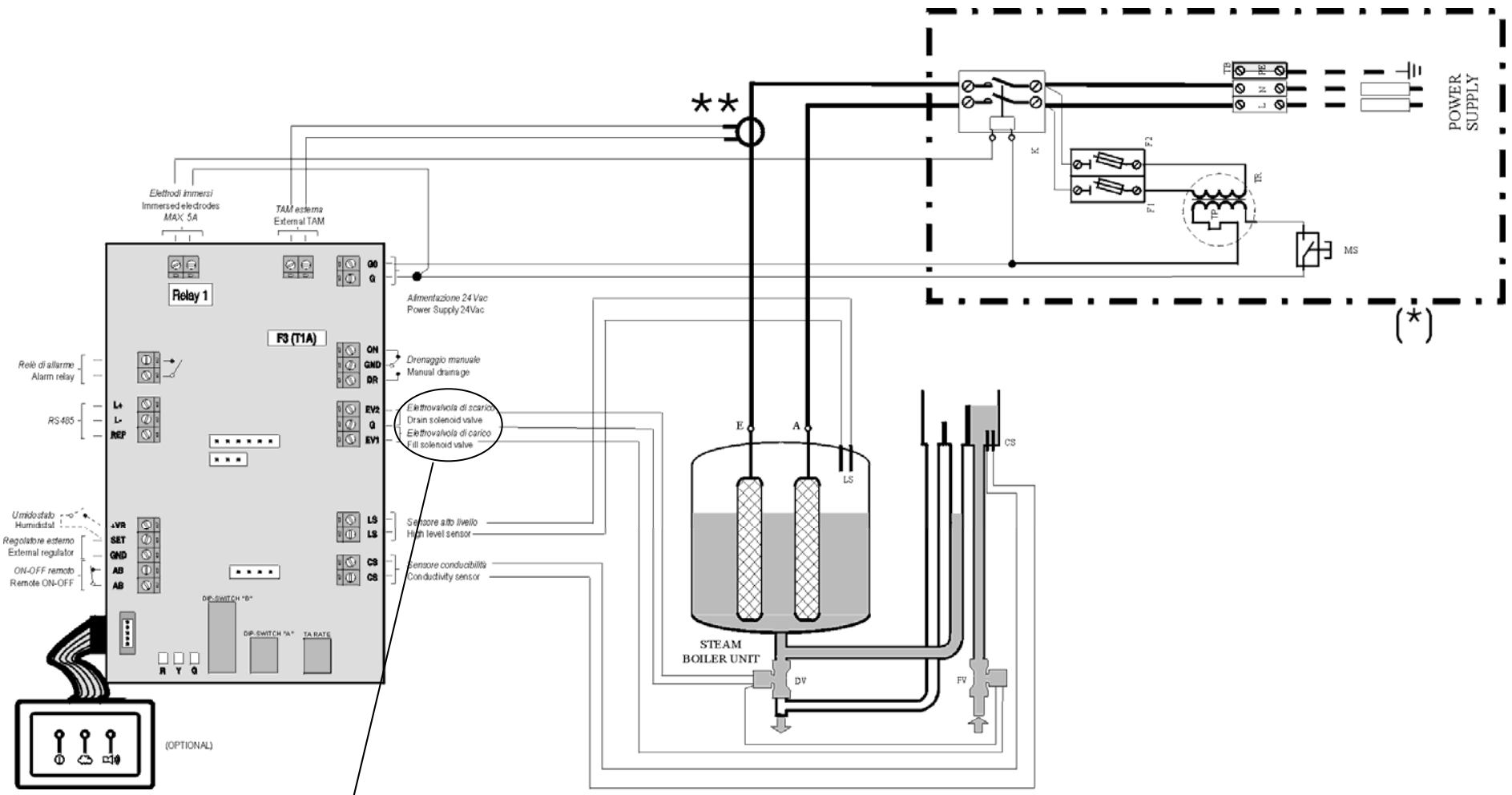
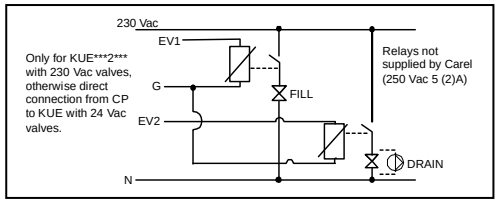



Fig. 4.d




(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.5 Three-phase wiring diagram, EXTERNAL TAM with contactor (CP3 *)

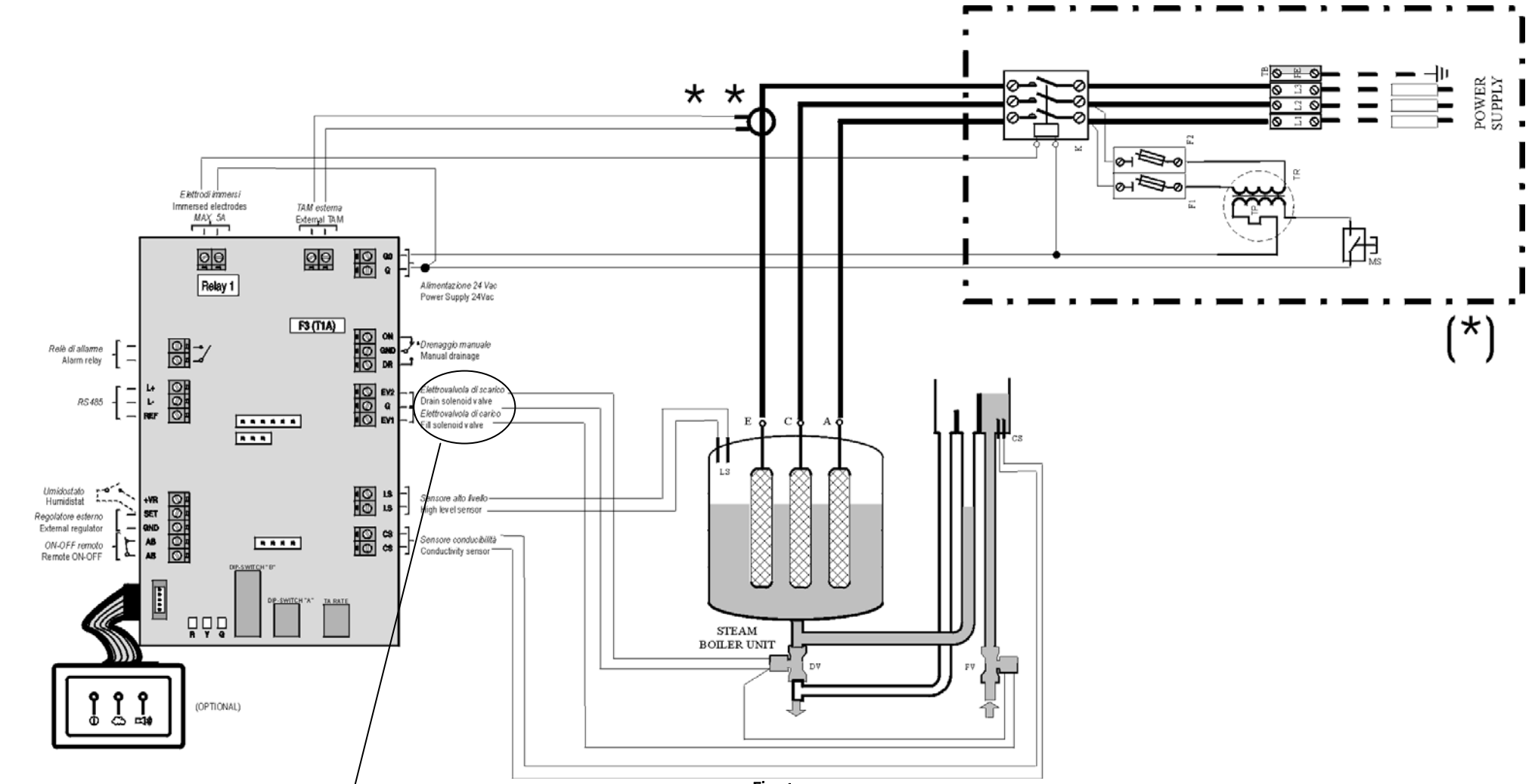



Fig. 4.e

(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.6 Three-phase wiring diagram, INTERNAL TAM with contactor (CP4 *)

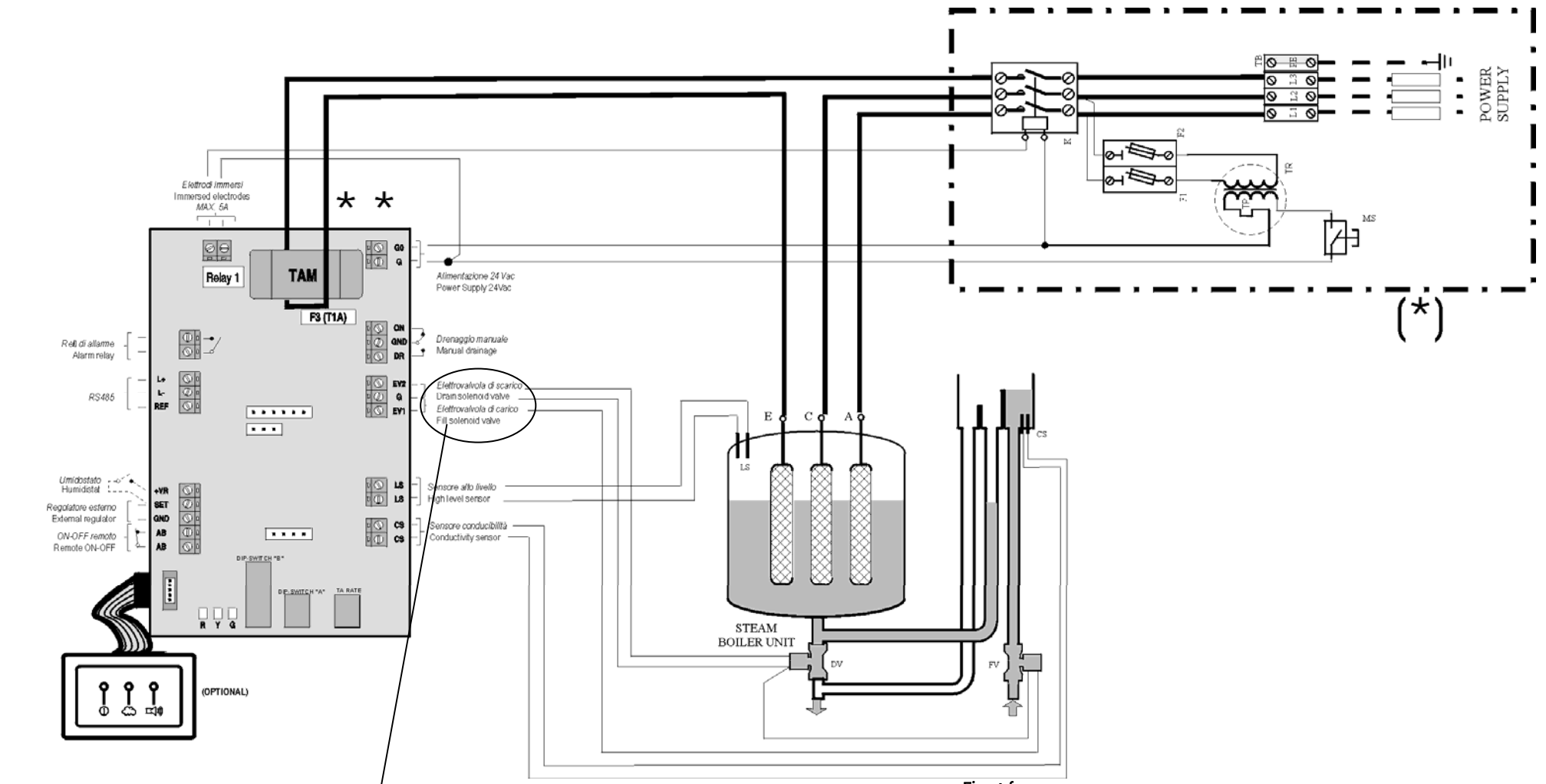
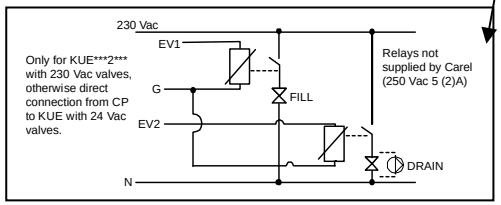



Fig. 4.f




(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.7 Three-phase wiring diagram, KUE with frame, INTERNAL TAM with contactor (CP4 *)

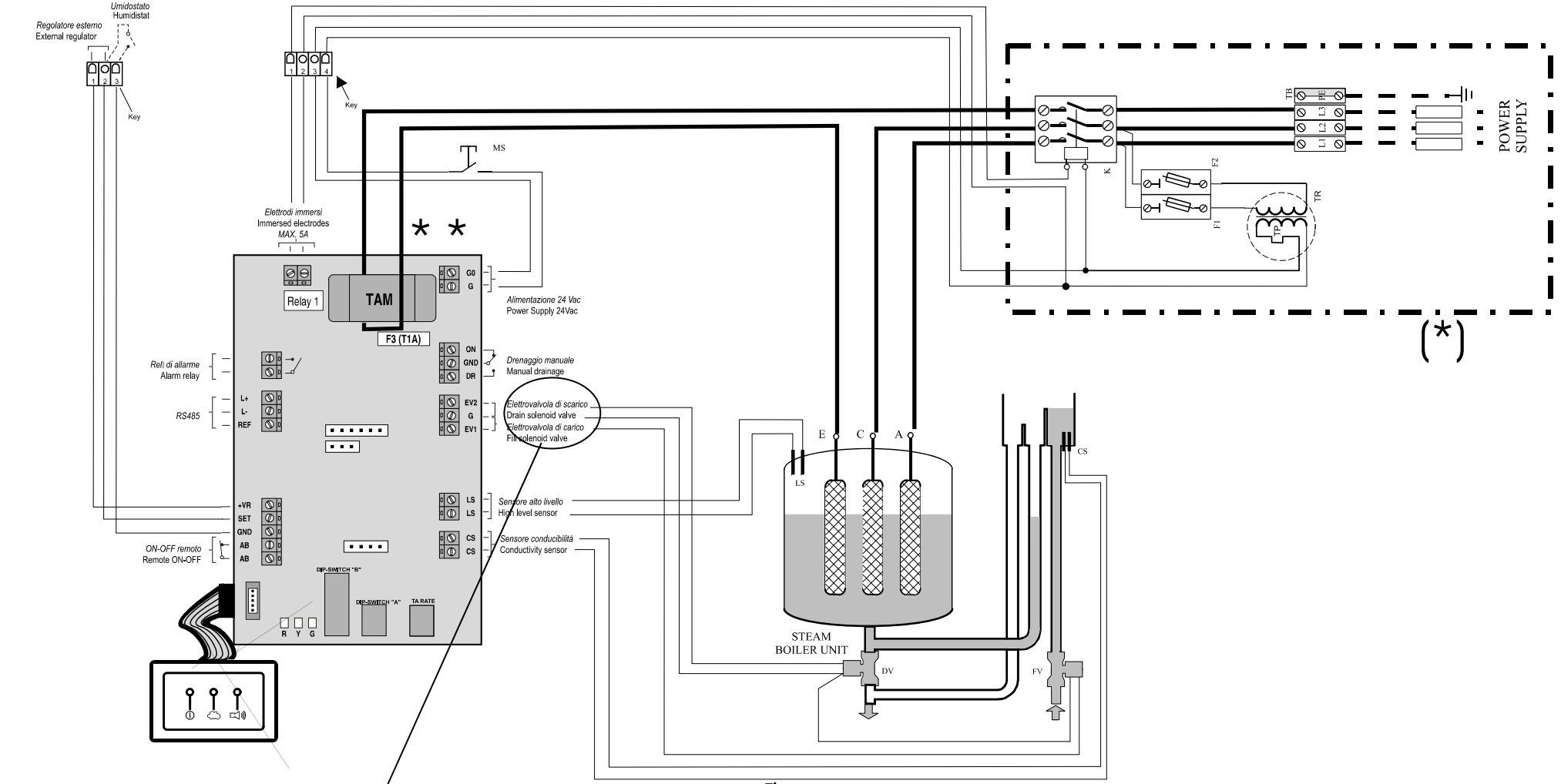
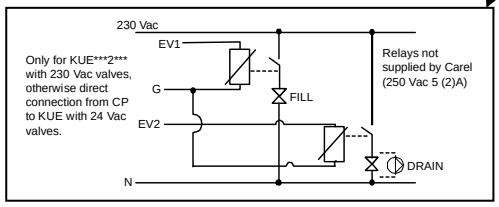



Fig. 4.g




(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.8 Single-phase wiring diagram, KUE with frame, INTERNAL TAM with contactor (CP4 *)

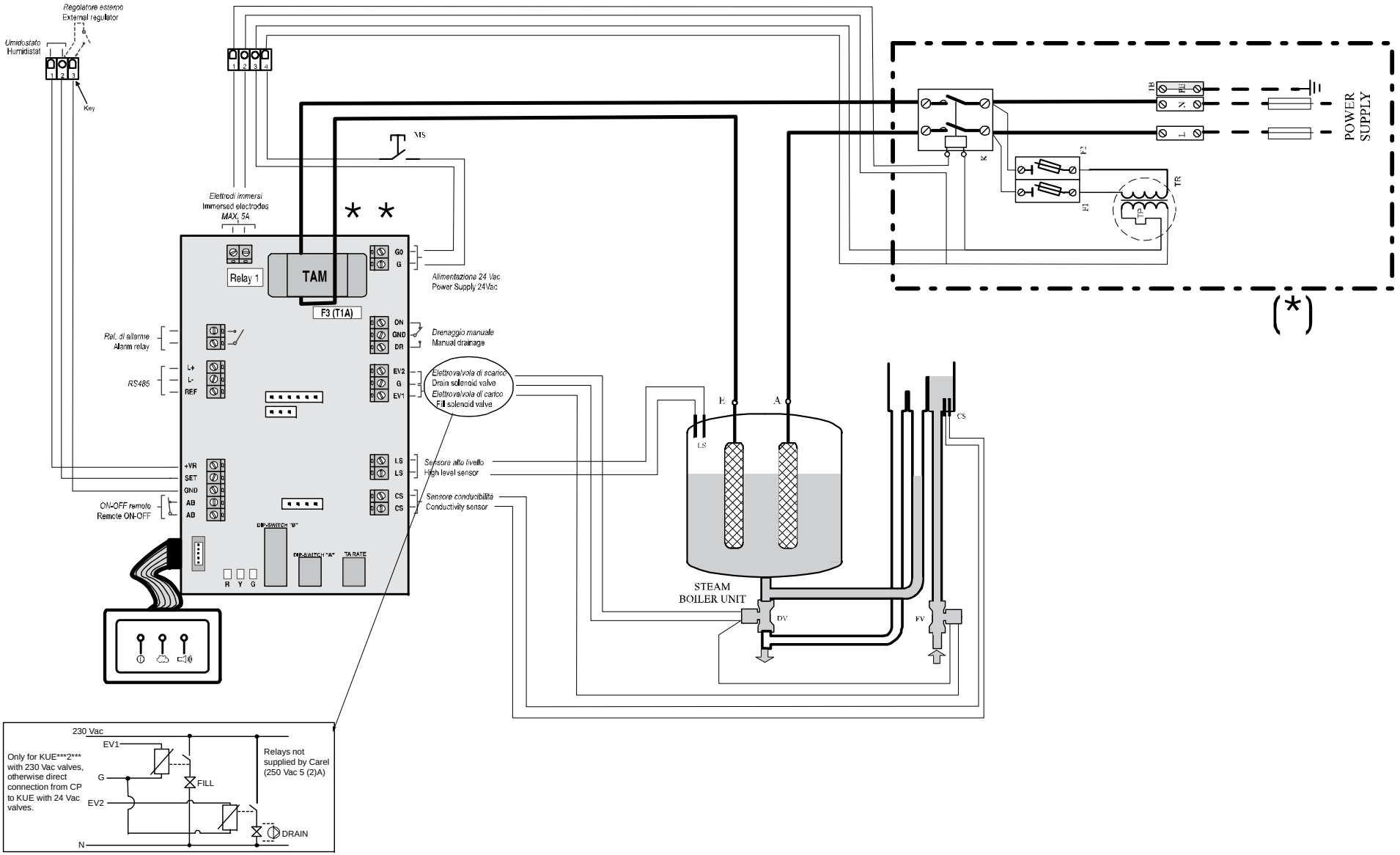



Fig. 4.h

(*) material not supplied by CAREL;
(**) refer manual +050003765

## 4.9 Three-phase wiring diagram, EXTERNAL TAM with contactor (CP3 *) for KUE*4

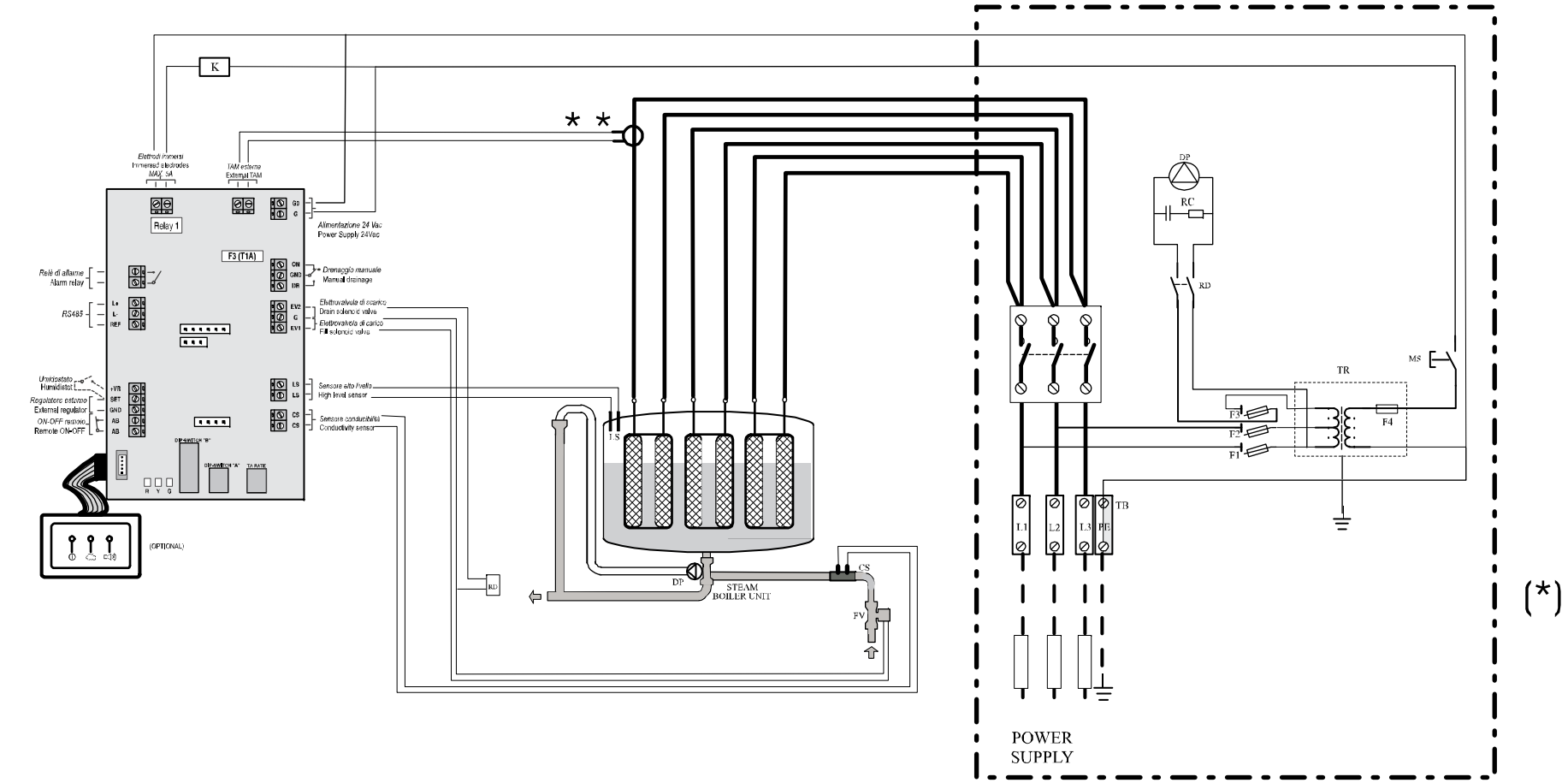
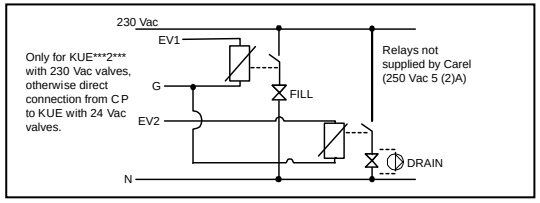



Fig. 4.i




(*) material not supplied by CAREL;
(**) refer manual +050003765

# 5. STARTING, CONTROL AND SHUTDOWN

IMPORTANT WARNINGS:

1. Before starting the unit, check that the humidifier is in good condition, that there are no water leaks and that the electrical parts are dry.
2. Do not power the appliance if it is damaged or even partially wet!

When installation is completed, flush the supply hose for around 30 minutes by piping the water directly into the drain without sending it into the humidifier. This will eliminate any scale or processing residues that may block the fill valve or cause foam when boiling.

## 5.1 Preliminary checks

Before starting the humidifier, check that:

- the water and electrical connections and the steam distribution system have been completed according to the instructions contained in this manual;
- the water shut-off tap to the humidifier is open;
- the line fuses are installed and intact;
- terminals AB on the CP control board are jumpered or connected to the remote ON/OFF contact; also check that the ON/OFF contact is closed;
- the steam outlet pipe is not choked.

## 5.2 Starting

### 5.2.1 Starting with an empty cylinder

This phase will be performed automatically when the unit is started: the rated production will be reached after a certain time (this times depends considerably on the conductivity of the supply water and may last a number of some hours).

# 6. MAINTENANCE AND SPARE PARTS

## 6.1 Replacing the cylinder

IMPORTANT WARNING: the cylinder may be hot. Allow it to cool before touching it or use protective gloves.

To access the cylinder:
- completely drain the water contained in the cylinder;
- turn the appliance off and open the mains power disconnecting switch (**safety procedure**);
- open and remove the cover;
- remove the steam hose from the cylinder;
- disconnect the electrical connections from the top of the cylinder;
- release the cylinder from the fastening device and lift it up to remove it;
- fit the new cylinder in the humidifier by performing the previous operations in reverse.

### Cylinder maintenance (refer to cylinders instruction sheet)

The life of the cylinder depends on a number of factors, including: the complete filling with lime scale and/or the partial or complete corrosion of the electrodes, the correct use and sizing of the humidifier, the output, and the quality of the water, as well as careful and regular maintenance. Due to the aging of the plastic and the consumption of the electrodes, even an openable steam cylinder has a limited life, and it is therefore recommended to replace it after 5 years or 10,000 operating hours.

### Important warnings

The humidifier and its cylinder contain live electrical components and hot surfaces, and therefore **all service and/or maintenance operations must be performed by expert and qualified personnel, who are aware of the necessary precautions**. Before performing any operations on the cylinder, check that the humidifier is disconnected from the power supply; carefully read and follow the instructions contained in the humidifier manual. Remove the cylinder from the humidifier only after having drained it completely using the corresponding button. Check that the model and the power supply voltage of the new cylinder correspond to the data on the rating plate.

### Periodical checks

- **After one hour of operation**

For both disposable and openable cylinders, check that there are no significant water leaks

- **Every fifteen days or no more than 300 operating hours**

For both disposable and openable cylinders check operation, that there are no significant water leaks and the general condition of the container. Check that during operation there are no arcs or sparks between the electrodes.

- **Every three months or no more than 1000 operating hours**

For disposable cylinders, check operation, that there are no significant water leaks and, if necessary, replace the cylinder; for openable cylinders, check that there are no markedly blackened parts of the container: if this is the case, check the condition of the electrodes, and if necessary replace them together with the O-rings and the cover gasket.

- **Annually or no more than 2500 operating hours**

For disposable cylinders, replace the cylinder; for openable cylinders check operation, that there are no significant water leaks, the general conditions of the container, check that there are no markedly blackened parts of the container: if this is the case, check the condition of the electrodes, and if necessary replace them together with the O-rings and the cover gasket.

- **After five years or no more than 10,000 operating hours**

For both disposable and openable cylinders, replace the cylinder.

After extended use or alternatively when using water with a high salt content, the solid deposits that naturally form on the electrodes may reach the stage where they also stick to the inside wall of the cylinder; in the event of especially conductive deposits, the consequent heat produced may overheat the plastic and melt it, and, in more severe cases, puncture the cylinder, allowing water to leak back into the tank.
As a precaution, check, at the frequency recommended further on, the deposits and the blackening of the wall of the cylinder, and replace the cylinder if necessary.

CAUTION: always disconnect the appliance before touching the cylinder in the event of leaks, as current may be passing through the water.

## 6.2 Maintenance of the other components in the water circuit

IMPORTANT WARNINGS:

- when cleaning the plastic components do not use detergents or solvents;
- scale can removed using a solution of 20% acetic acid and then rinsing with water.

The steam humidifier has just one part that requires periodical replacement: **the steam production cylinder.**
This operation is necessary when the lime scale deposits that form inside the cylinder prevent the sufficient passage of current. This situation is displayed on the controller by an alarm signal. The frequency of this operation depends on the supply water: the higher the content of salts or impurities, the more frequently the cylinder will need replacing.

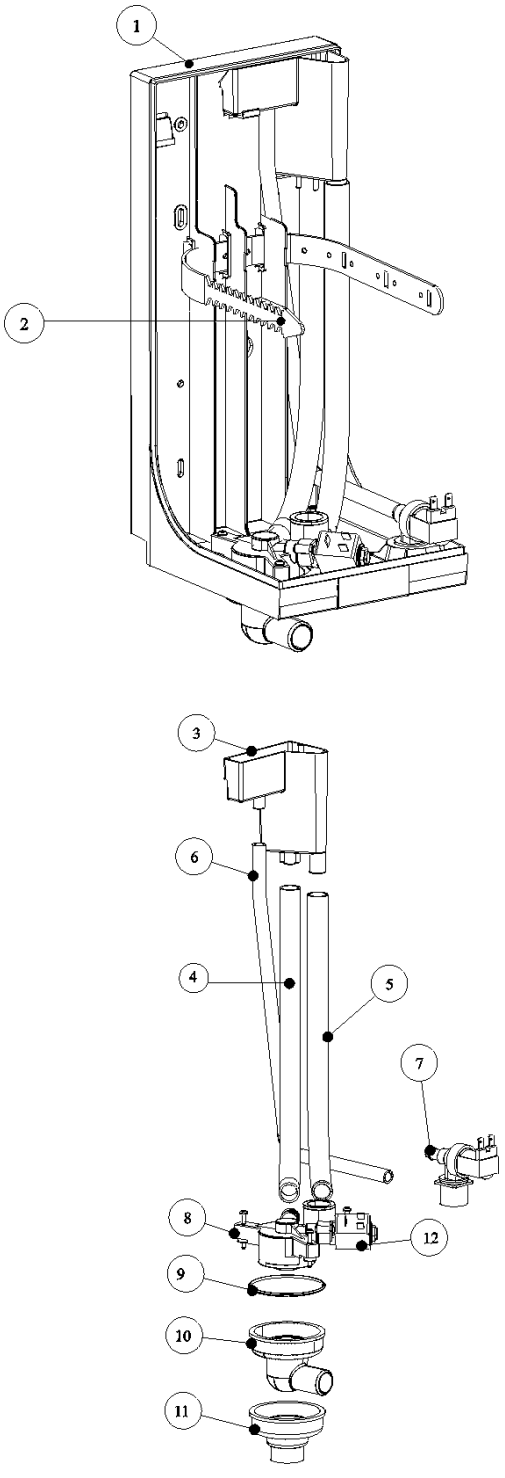



Fig. 6.a

| no | description | Order code |
|---|---|---|
| 1 | Load-bearing frame | |
| 2 | Cylinder locking strap | 18C499A006 |
| 3 | Supply tank + conductivity meter | 13C119A003 |
| 4 | Overflow pipe | UEKT00000* |
| 5 | Cylinder fill hose | |
| 6 | Tank fill hose | |
| 7 | Fill solenoid valve (24 Vac) | KITVC000** (rif. Tab. 6.d) |
| 7 bis | Fill solenoid valve (230 Vac) | KITVC020** (rif. Tab. 6.d) |
| 8 | Fill/Drain group | 13C499A030 |
| 9 | Gasket | KITRACC000 |
| 10 | 90° drain connector | |
| 11 | Straight drain connector (supplied) | |
| 12 | Drain solenoid valve (24 Vac) | 13C499A030 |
| 12 bis | Drain solenoid valve (230 Vac) | 13C499A044 |

Tab. 6.a

* for the complete codes see Table 5.4.1.1 and 5.4.3.1 " SPARE PARTS"

- **Fill solenoid valve** (Fig. 6.a, part no. 7, 5)

After having disconnected the cables and the pipe, remove the solenoid valve and check the condition of the inlet filter; clean if necessary using water and a soft brush.

- **Supply and drain manifold** (Fig. 6.a, part no. 8, 2)

Check that there are no solid residues in the cylinder attachment, remove any impurities.
Check that the seal (O-ring) not is damaged or cracked; if necessary, replace it.

- **Drain solenoid valve / drain pump** (Fig. 6.a, part no. 12, 4)

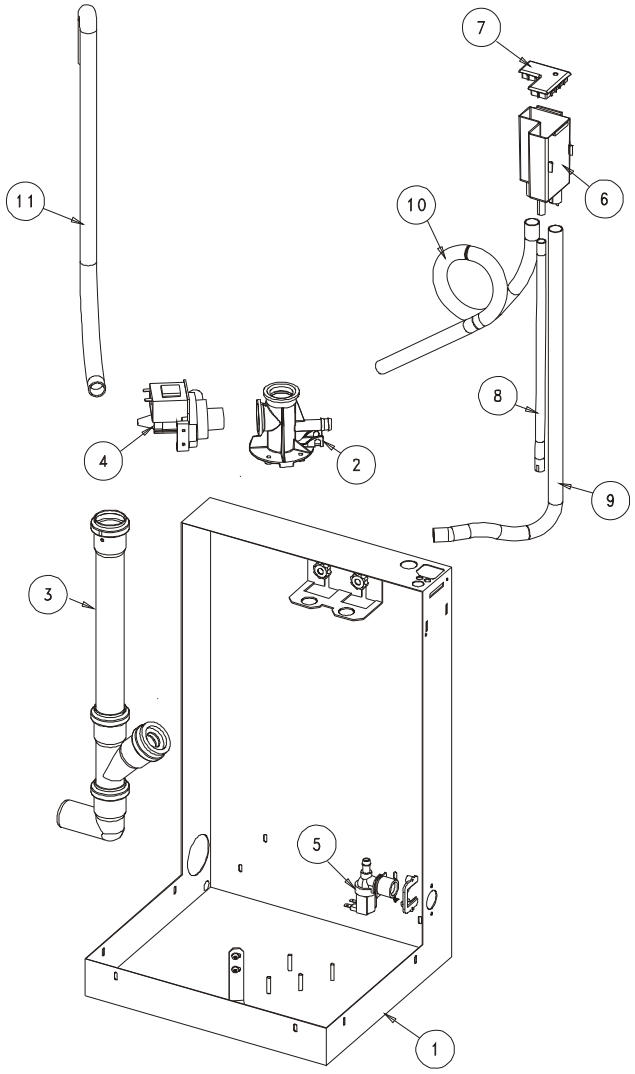
Disconnect the power supply, remove the coil, unscrew the fastening screws and remove the valve body; remove any impurities and rinse.

- **Supply tank + conductivity meter** (Fig. 6.a, part no. 3, 6)

Check that there are no obstructions or solid particles and that the electrodes for measuring the conductivity are clean, remove any impurities and rinse.

- **Supply, fill, overflow pipes** (Fig. 6.a, part no. 4, 5, 6 – 8, 9, 10, 11)

Check that these are free and do not contain impurities; remove any impurities and rinse.




| no | description | Order code |
|---|---|---|
| 1 | Load-bearing frame | |
| 2 | Supply/drain manifold | 18C499A001 |
| 3 | Drain circuit | 13C499A034 |
| 4 | Drain pump | KITPSE0000 |
| 5 | Fill solenoid valve (24 vac) | KITVC00040 |
| 5 bis | Fill solenoid valve (230 vac) | KITVC02040 |
| 6 | Supply tank | UEKVASC000 |
| 7 | Supply tank cover | |
| 8 | Tank fill hose | UEKT0000XL |
| 9 | Cylinder fill hose | |
| 10 | Overflow pipe | |
| 11 | Corrugated drain pipe | 13C479A001 |

Table 6.b

IMPORTANT WARNING: after having replaced or checked the parts in the water circuit, check that the connections have been carried out correctly and the corresponding seals have been used. Re-start the unit and perform a number of fill and drain cycles (from 2 to 4), then, applying the safety procedure, check for any water leaks.

## 6.3 Component replacement

### 6.3.1 Fuses in the auxiliary circuits

| models | KUES* | KUETR* | KUET1* | KUET2* | KUET3* | KUET4* |
|---|---|---|---|---|---|---|
| fuses F1-F 2 | 1 A, GL, 10.3 x 38 in fuse carrier on DIN rail (0605319AXX) | | | | | |
| fuse F3 (pump) | | | | | | 1 A, fast-blow 10.3 x 38 in fuse carrier on DIN rail (0605319AXX) |
| fuse 3 *** | 1 A, T, 5x20 | | | | | |

Table 6.c

***: only on the CP control board.

## 6.4 Spare parts

### 6.4.1 SINGLE-PHASE humidifiers:

Standard spare parts

| model | KUESR* | KUES1* | KUES2* | KUES3* |
|---|---|---|---|---|
| **Water circuit** | | | | |
| cylinder locking strap | 18C499A006 | 18C499A006 | 18C499A006 | 18C499A006 |
| supply tank + conductivity meter | 13C119A003 | 13C119A003 | 13C119A003 | 13C119A003 |
| fill solenoid valve kit (24 Vac) | KITVC00006 | KITVC00006 | KITVC00006 | KITVC00012 |
| drain solenoid valve kit (24 Vac) | 13C499A030 | 13C499A030 | 13C499A030 | 13C499A030 |
| fill solenoid valve kit (230 Vac) | KITVC02008 | KITVC02008 | KITVC02008 | KITVC02012 |
| drain solenoid valve kit (230 Vac) | 13C499A044 | 13C499A044 | 13C499A044 | 13C499A044 |
| drain fittings kit | KITRACC000 | KITRACC000 | KITRACC000 | KITRACC000 |
| internal hose kit * | UEKT00000S | UEKT00000S | UEKT00000S | UEKT00000S |
| **Sealed cylinders** | | | | |
| 200 to 230 VAC 1~, conductivity 350 to 1250 µS/cm | BL0SRF00H1 | BL0S1F00H1 | BL0S2F00H0 | BL0S3F00H0 |
| **Electronics** | | | | |
| control board ver. CP ** | CP** | | | |
| control board ver. CPY ** | CPY** | | | |

Table 6.d

**: specify kg/h, power supply, options
*: hoses must be cut to the required size before installation

### 6.4.2 Spare parts for special applications

The following spare parts are supplied separately from the standard humidifier, therefore they must be ordered separately.

| model | KUESR* | KUES1* | KUES2* | KUES3* |
|---|---|---|---|---|
| **Sealed cylinders** | | | | |
| 200 to 230 VAC 1~, conductivity 125 to 350 µS/cm | BL0SRE00H1 | BL0S1E00H1 | BL0S2E00H0 | BL0S3E00H0 |

Table 6.e

### 6.4.3 THREE-PHASE humidifiers:

Standard spare parts

| MODEL | KUETR* | KUET1* | KUET2* | KUET3* | KUET4* 25kg/h | KUET4* 35kg/h | KUET4* 45kg/h≥400V |
|---|---|---|---|---|---|---|---|
| **Water circuit** | | | | | | | |
| cylinder locking strap | 18C499A006 | 18C499A006 | 18C499A006 | 18C499A006 | -- | -- | -- |
| supply tank + conductivity meter | 13C119A003 | 13C119A003 | 13C119A003 | 13C119A003 | 18C453A008 | 18C453A008 | 18C453A008 |
| fill solenoid valve kit (24 Vac) | KITVC00006 | KITVC00006 | KITVC00006 | KITVC00012 | KITVC00040 | KITVC00040 | KITVC00040 |
| drain solenoid valve kit (24 Vac) | 13C499A030 | 13C499A030 | 13C499A030 | 13C499A030 | KITPSE0000 | KITPSE0000 | KITPSE0000 |
| fill solenoid valve kit (230 Vac) | KITVC02008 | KITVC02008 | KITVC02008 | KITVC02012 | KITVC02040 | KITVC02040 | KITVC02040 |
| drain solenoid valve kit (230 vac) | 13C499A044 | 13C499A044 | 13C499A044 | 13C499A044 | KITPSE0000 | KITPSE0000 | KITPSE0000 |
| drain fittings kit | KITRACC000 | KITRACC000 | KITRACC000 | KITRACC000 | -- | -- | -- |
| internal hose kit * | UEKT00000S | UEKT00000S | UEKT00000M | UEKT00000M | UEKT0000XL | UEKT0000XL | UEKT0000XL |
| **Sealed cylinders** | | | | | | | |
| 200 to 230 VAC 3~,conductivity 350 to 1250µS/cm | BL0TRB00H1 | BL0T1B00H1 | BL0T2B00H0 | BL0T3B00H0 | BL0T4C00H0 | BL0T4B00H0 | -- |
| 400 VAC 3~, conductivity 350 to 750 µS/cm | -- | BL0T1C00H0 | BL0T2C00H0 | BL0T3C00H0 | -- | -- | -- |
| 400 VAC 3~, conductivity 350 to 1250 µS/cm | BL0TRD00H0 | -- | -- | -- | BL0T4D00H0 | BL0T4D00H0 | BL0T4C00H0 |
| **Electronics** | | | | | | | |
| control board ver. CP ** | CP** | | | | | | |
| control board ver. CPY ** | CPY** | | | | | | |

Table 6.f

**: specify kg/h, power supply, options
*: hoses must be cut to the required size before installation

### 6.4.4 Spare parts for special applications

The following spare parts are supplied separately from the standard humidifier, therefore they must be ordered separately.

| MODEL | KUETR* | KUET1* | KUET2* | KUET3* | KUET4* (25kg/h) | KUET4* (35kg/h) | KUET4* (45kg/h≥400V) |
|---|---|---|---|---|---|---|---|
| **Sealed cylinders** | | | | | | | |
| 200 to 230 VAC 3~, conductivity 125 to 350 µS/cm | BL0TRA00H1 | BL0T1A00H1 | BL0T2A00H0 | BL0T3A00H0 | BL0T4B00H0 | BL0T4B00H0 | |
| 400 VAC 3~, conductivity 125 to 350 µS/cm | BL0TRC00H1 | BL0T1A00H1 | BL0T2B00H0 | BL0T3B00H0 | BL0T4C00H0 | BL0T4C00H0 | BL0T4B00H0 |
| 400 VAC 3~, conductivity 350 to 750 µS/cm | BL0TRD00H1 | BL0T1C00H1 | BL0T2C00H0 | BL0T3C00H0 | BL0T4D00H0 | BL0T4D00H0 | BL0T4C00H0 |
| 400 VAC 3~, conductivity 750 to 1250 µS/cm | BL0TRD00H1 | BL0T1D00H1 | BL0T2D00H0 | BL0T3D00H0 | BL0T4D00H0 | BL0T4D00H0 | BL0T4D00H0 |
| 460 VAC 3~, conductivity 125 to 350 µS/cm | BL0TRL00H1 | BL0T1B00H1 | BL0T2C00H0 | BL0T3C00H0 | BL0T4D00H0 | BL0T4C00H0 | BL0T4C00H0 |
| 460 VAC 3~, conductivity 350 to 1250 µS/cm | BL0TRMC0H1 | BL0T1D00H1 | BL0T2D00H0 | BL0T3D00H0 | BL0T4D00H0 | BL0T4D00H0 | BL0T4D000H0 |
| 575 VAC 3~, conductivity 125 to 350 µS/cm | -- | -- | BL0T2C00H0 | BL0T3C00H0 | BL0T4D00H0 | BL0T4D00H0 | BL0T4D00H0 |
| 575 VAC 3~, conductivity 350 to 1250 µS/cm | -- | -- | BL0T2D00H0 | BL0T3D00H0 | BL0T4D00H0 | BL0T4D00H0 | BL0T4D00H0 |
| **Openable cylinders** | | | | | | | |
| 200 to 230 VAC 3~, conductivity 125 to 350 µS/cm | BLCTRA00W1 | BLCT1A00W1 | BLCT2A00W0 | BLCT3A00W0 | BLCT4B00W0 | BLCT4B00W0 | |
| 200 to 230 VAC 3~, conductivity 350 to 1250 µS/cm | BLCTRB00W1 | BLCT1B00W1 | BLCT2B00W0 | BLCT3B00W0 | BLCT4C00W0 | BLCT4B00W0 | |
| 400 VAC 3~, conductivity 125 to 350 µS/cm | BLCTRC00W1 | BLCT1A00W1 | BLCT2B00W0 | BLCT3B00W0 | BLCT4C00W0 | BLCT4C00W0 | BLCT4B00W0 |
| 400 VAC 3~, conductivity 350 to 750 µS/cm | BLCTRD00W1 | BLCT1C00W1 | BLCT2C00W0 | BLCT3C00W0 | | | |
| 400 VAC 3~, conductivity 350 to 1250 µS/cm | BLCTRD00W1 | | | | BLCT4D00W0 | BLCT4D00W0 | BLCT4C00W0 |
| 400 VAC 3~, conductivity 750 to 1250 µS/cm | | BLCT1D00W1 | BLCT2D00W0 | BLCT3D00W0 | | | |
| 460/575 VAC 3~, conductivity 125 to 350 µS/cm | | | BLCT2C00W0 | BLCT3C00W0 | BLCT4D00W0 | | |
| 460/575 VAC 3~, conductivity 350 to 1250 µS/cm | | | BLCT2D00W0 | BLCT3D00W0 | BLCT4D00W0 | | |
| 460 VAC 3~, conductivity 125 to 350 µS/cm | BLCTRL00W1 | BLCT1B00W1 | | | | BLCT4C00W0 | BLCT4C00W0 |
| 460 VAC 3~, conductivity 350 to 1250 µS/cm | BLCTRM00W1 | BLCT1D00W1 | | | | BLCT4D00W0 | BLCT4D00W0 |
| 575 VAC 3~, conductivity 125 to 350 µS/cm | | | | | | BLCT4D00W0 | BLCT4D00W0 |
| 575 VAC 3~, conductivity 350 to 1250 µS/cm | | | | | | BLCT4D00W0 | BLCT4D00W0 |
| electrode kit (200 to 230 VAC 3~, 125 to 350 µS/cm) | | | KITBLCT2A0 | KITBLCT3A0 | KITBLCT4B0 | KITBLCT4B0 | |
| electrode kit (200 to 230 VAC 3~, 350 to 1250 µS/cm) | | | KITBLCT2B0 | KITBLCT3B0 | KITBLCT4B0 | KITBLCT4B0 | |
| electrode kit (400 VAC 3~, 125 to 350 µS/cm) | | | KITBLCT2B0 | KITBLCT3B0 | KITBLCT4C0 | KITBLCT4C0 | KITBLCT4B0 |
| electrode kit (400 VAC 3~, 350 to 750 µS/cm) | | | KITBLCT2C0 | KITBLCT3C0 | | | |
| electrode kit (400 VAC 3~, 350 to 1250 µS/cm) | | | | | KITBLCT4D0 | KITBLCT4D0 | KITBLCT4C0 |
| electrode kit (400 VAC 3~, 750 to 1250 µS/cm) | | | KITBLCT2D0 | KITBLCT3D0 | | | |
| electrode kit (460/575 VAC 3~, 125 to 350 µS/cm) | | | KITBLCT2C0 | KITBLCT3C0 | KITBLCT4D0 | | |
| electrode kit (460/575 VAC 3~, 350 to 1250 µS/cm) | | | KITBLCT2D0 | KITBLCT3D0 | KITBLCT4D0 | | |
| electrode kit (460 VAC 3~, 125 to 350 µS/cm) | | | | | | KITBLCT4C0 | KITBLCT4C0 |
| electrode kit (460 VAC 3~, 350 to 1250 µS/cm) | | | | | | KITBLCT4D0 | KITBLCT4D0 |
| electrode kit (575 VAC 3~, 125 to 350 µS/cm) | | | | | | KITBLCT4D0 | KITBLCT4D0 |
| electrode kit (575 VAC 3~, 350 to 1250 µS/cm) | | | | | | KITBLCT4D0 | KITBLCT4D0 |
| electrode gasket kit | | | KITBLC2FG0 | KITBLC3FG0 | | | |

Table 6.g

## 6.5 Troubleshooting

For the alarms, see instruction sheet +050003765, which is an integral part of this manual.

| PROBLEM | CAUSES | SOLUTION |
|---|---|---|
| the humidifier does not turn on | 1. no electrical power supply;<br>2. controller connectors inserted incorrectly;<br>3. fuses blown;<br>4. transformer fault | 1. check the protection device upstream of the humidifier and that the power supply is present;<br>2. check that the connectors are properly inserted in terminal block;<br>3. check fuses F1/F2/F3;<br>4. check that the voltage at the transformer secondary is 24 Vac |
| the humidifier does not start operation | 1. remote ON/OFF contact open (relay/terminals AB – AB) on CP controller<br>2. control signal not compatible with the type set | 1. close the ON/OFF contacts (relay/terminals AB – AB) on CP controller<br>2. check that the external signal is 0 to 10 V |
| the humidifier fills with water without producing steam | 1. excessive backpressure in steam outlet;<br>2. cylinder inlet filter blocked;<br>3. lime scale in the supply tank;<br>4. drain solenoid valve fault | 1. check that the steam outlet hose is not bent or choked;<br>2. clean the filter;<br>3. clean the supply tank;<br>4. check for abnormal voltage (24 Vac and/or 230 Vac) at drain solenoid valve and/or replace the drain solenoid valve |
| the line thermal overload switch is activated | 1. the thermal overload switch is undersized<br>2. excess current to the electrodes | 1. check that the **thermal overload switch** is rated for a current equal to at least **1.5 times the rated current** of the humidifier<br>2. check the operation of the drain solenoid valve, the seal of the fill solenoid valve when not energised, drain some of the water and re-start |
| the humidifier wets the duct | 1. the steam distributor is not installed correctly (too near the top of the duct or the condensate return is blocked);<br>2. the system is oversized;<br>3. humidifier on when the fan in the duct is off | 1. check that the steam distributor has been installed correctly;<br>2. decrease the steam production set on the controller;<br>3. check the connection of a device (flow switch or differential pressure switch) slaving the operation of the humidifier to the fan in the duct (terminals AB - AB) on the CP controller |
| the humidifier wets the floor below | 1. the supply or overflow circuit has leaks;<br>2. the steam outlet hose is not properly secured to the cylinder | 1. check the entire water circuit;<br>2. check that the clamp on the steam outlet is tight |

Table 6.h

## 6.6 Alarms

For the alarms, see instruction sheet +050003765, which is an integral part of this manual.

# 7. OPERATING PRINCIPLE, CONTROL AND OTHER FUNCTIONS

## 7.1 Operating principle

In an electrode humidifier the production of humidity is obtained inside a cylinder (boiler) containing water that is heated to and then held at boiling temperature. The water that evaporates over time is automatically replaced with water from the mains supply. **The heat required to boil the water is produced by passing an electrical current through the cylinder. This is done by connecting the electrodes immersed inside the cylinder to the mains power supply.**

The quantity of current that initially flows depends greatly on the type of water supplied from the mains. Normally, a recently-started cylinder has low current; nonetheless, over time the quantity of salts inside the water increases (evaporation in fact does not carry the salts with it). This allows the level of current required by the unit to provide the quantity of steam requested to be reached.

In stable operating conditions, the level of production required is automatically achieved using the water level control on the cylinder. This is in fact reflected in higher or lower levels of current.

The salts introduced by the automatic refilling of the water are partly deposited as lime scale inside the cylinder, contributing to the progressive depletion of the cylinder, and partly remain dissolved in the water. To avoid excessive accumulation of salts, a quantity of water is periodically and automatically drained and then replaced with fresh water.

## 7.2 Control principles

The range of humidifiers includes the following control options.

### 7.2.1 ON/OFF control - CP controllers

The action is all or nothing, activated by an external contact that consequently determines the control set point and differential.

### 7.2.2 Proportional control - CP controllers

The steam production (quantity per hour) is proportional to the value of a signal Y coming from an external device; the type of signal can be selected – programmed via RS485 – from the following standards: 0 to 10 V (default), 2 to 10 V, 0 to 1 V. The entire range is indicated as BP (proportional band).

The maximum production, Pmax, corresponding to the maximum value of the Y external signal, and can be programmed between 20% and 100% of the rated humidifier value (dip A3-A4).

The minimum production, Pmin, is set to 20% of the rated value, with an activation hysteresis, given by the value hy, corresponding to 2% of the entire BP interval of the external signal Y.

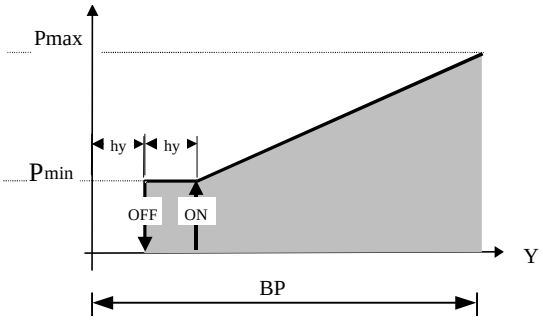



Fig. 7.a

# 8. TECHNICAL SPECIFICATIONS

| MODEL | KUETR* | KUESR* | KUES1* | KUET1* | KUES2* | KUET2* | KUES3* | KUET3* | KUET4* |
|---|---|---|---|---|---|---|---|---|---|
| **steam** | | | | | | | | | |
| flow-rate (kg/h) | 1.5 to 3 | 1.5 to 3 | 1.5 to 3 | 1.5 to 3 | 5 | 5 to 8 | 9 | 10 to 15 | 25 to 45 |
| connection (dia. mm) | 22/30 | | | | 30 | | | | 40 |
| outlet pressure limits (Pa) | 0 to 500 | | | | 0 to 500 | | | 0 to 600 | 0 to 2300 |

| | | | |
|---|---|---|---|
| **supply water** | | | |
| connection | G¾ | | |
| temperature limits (°C) | 1 to 40 | | |
| pressure limits (MPa) | 0.1…0.8 (1 to 8 bar, 14.5 to 116 psi) | | |
| hardness limits (°fH) | ≤ 40 | | |
| instant flow-rate (l/min) | 0.6 | 1.2 | 4 |
| range of conductivity (µS/cm) | 125 to 1250 | | |

| | | |
|---|---|---|
| **drain water** | | |
| connection (ϕ mm) | 32 | 40 |
| typical temperature (°C) | ≤100 | |
| instant flow-rate (l/min) | ~ 4 | 22.5 |

| | | |
|---|---|---|
| **environmental conditions** | | |
| ambient operating temperature (°C) | 1 to 50 | |
| ambient operating humidity (% rH) | 10 to 60 ( 90 non-condensing) | |
| storage temperature (°C) | -10T70 | |
| storage humidity (% rH) | 5 to 95 | |
| index of protection (CEI EN 60529) | IP00 | |

| | | |
|---|---|---|
| **electronic controller (see CP controller instruction sheet)** | | |
| type | CP1*, CP2*, CP3*, CP4* | CP3* |
| auxiliary voltage / frequency (V - Hz) | 24VAC(-15% to +10%) / 50 - 60Hz | |
| maximum auxiliary power (VA) | 30 | |
| signal inputs | input impedance for 0 to 10 V, 2 to 10 V, 0 to 1 V signals: 15 kΩ | |

Electrical specifications: see the instruction sheet for the CP controller, code +050003765

| MODEL | KUETR* | | KUESR* | | KUES1* | | KUET1* | | KUES2* | KUET2* | | KUES3* | KUET3* | | KUET4* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power** | | | | | | | | | | | | | | | | | |
| | 1.5 | 3 | 1.5 | 3 | 1.5 | 3 | 1.5 | 3 | 5 | 5 | 8 | 9 | 10 | 15 | 25 | 35 | 45 |
| rated power supply voltage: 208V-1~N code U | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | 1.5 | 3 | 1.5 | 3 | 1.5 | 3 | 1.5 | 3 | 5 | | | 8.7 | | | | | |
| power input at rated voltage (kW) | 1.12 | 2.25 | 1.12 | 2.25 | 1.12 | 2.25 | 1.12 | 2.25 | 3.75 | | | 6.52 | | | | | |
| rated power supply voltage: 230V-1~N code D | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | 5 | | | 9 | | | | | |
| power input at rated voltage (kW) | | | | | | | | | 3.75 | | | 6.75 | | | | | |
| rated power supply voltage: 208V-3~ code W | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | | 5 | 8 | | 10 | 15 | 25 | 35 | |
| power input at rated voltage (kW) | | | | | | | | | | 3.75 | 6.00 | | 7.50 | 11.25 | 18.75 | 26.25 | |
| rated power supply voltage: 230V-3~ code K | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | | 5 | 8 | | 10 | 15 | 25 | 35 | |
| power input at rated voltage (kW) | | | | | | | | | | 3.75 | 6.00 | | 7.50 | 11.25 | 18.75 | 26.25 | |
| rated power supply voltage: 400V-3~ code L | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | | 5 | 8 | | 10 | 15 | 25 | 35 | 45 |
| power input at rated voltage (kW) | | | | | | | | | | 3.75 | 6.00 | | 7.50 | 11.25 | 18.75 | 26.25 | 33.75 |
| rated power supply voltage: 460V-3~ code M | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | | 5 | 8 | | 10 | 15 | 25 | 35 | 45 |
| power input at rated voltage (kW) | | | | | | | | | | 3.75 | 6.00 | | 7.50 | 11.25 | 18.75 | 26.25 | 33.75 |
| rated power supply voltage: 575V-3~ code N | | | | | | | | | | | | | | | | | |
| instant steam production (1) (kg/h) | | | | | | | | | | 5 | 8 | | 10 | 15 | 25 | 35 | 45 |
| power input at rated voltage (kW) | | | | | | | | | | 3.75 | 6.00 | | 7.50 | 11.25 | 18.75 | 26.25 | 33.75 |

Tab. 8.a

CAREL reserves the right to modify or change its products without prior notice.

NOTE: _____

NOTE: _____

CAREL

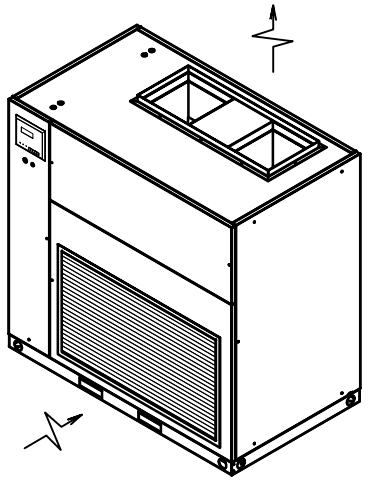
**CAREL INDUSTRIES HQs**
Via dell'Industria, 11 - 35020 Brugine - Padova (Italy)
Tel. (+39) 049.9716611  Fax (+39) 049.9716600
http: //www.carel.com - e-mail: carel@carel.com

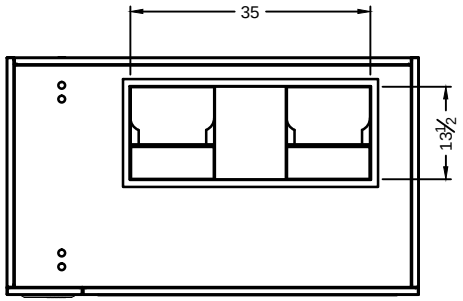
+030221791 - OEM - Rel. 2.5 - 02/02/11

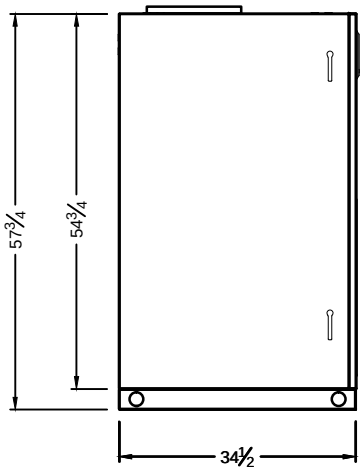
# 16.- PLANO FISICO

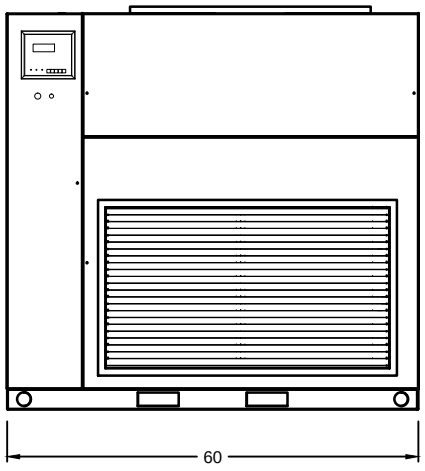
# HOJA DE DATOS

| | | |
|---|---|---|
| EQUIPO | | CENTRO DE COMPUTO CONDENSACION POR AIRE |
| MODELO | | UCC08EVAX3D |
| COMPRESOR | (1) | COPELAND SCROLL ZP83KCE-TF5 |
| | | 208-230V/3F/60HZ |
| | | 27.9 RLA 164.0 LRA |
| REFRIGERANTE | | R-410A |
| SERPENTIN ENFRIAMIENTO | | TUBO COBRE / ALETA ALUMINIO |
| - SERPENTIN EXPANSION DIRECTA | (1) | SER-DX-11.1-0314-40R |
| - FILA / FPI | | 3/14 |
| - AREA | | 11.1 PIE² TOTAL |
| - CONEXIONES | | SUCCION 1 1/8"Ø O.D. |
| | | LIQUIDO 1/2"Ø O.D. |
| VENTILADOR | | CENTRIFUGO ALETAS CURVAS HACIA ADELANTE |
| - MODELO | (2) | A12-9AT, B - 1" Ø COMPACTO |
| | | 4800 CFM, 800 RPM @ 2.3 C.A. PRESION ESTATICA TOTAL |
| - MOTOR | (2) | 1.0 H.P. 1050 RPM VELOCIDAD VARIABLE |
| | | 230V/1F/60C, FRAME 48 EJE Ø 1" |
| | | 7.6 FLA @230V |
| FILTROS | | CELL 60-65% EFFIC |
| | (2) | 20" x 24" x 4" NOMINAL |
| | | CELL 90-95% EFFIC |
| | (2) | 20" x 24" x 4" NOMINAL |
| RECALENTAMIENTO | | RESISTENCIA ELECTRICA TUBULAR ALETEADA |
| - BTUH TOTAL | | 49.350 BTUH |
| - KW TOTAL | | 14.1 KW |
| | | 230V/3F/60HZ |
| - ETAPAS | | 2 |
| HUMIDIFICACION | | TIPO CANISTER |
| - CICLO | | AUTOMATICO |
| - PRODUCCION | | 13 Kg/h |
| - CONSUMO | | 9.4 KW |
| | | 230V/3F/60HZ |
| GABINETE | | |
| - ESTRUCTURA | | ANGULO ACERO 1" x 1" x 3/16" |
| - BANDEJA DRENAJE | | LAMINA ACERO INOX. CAL. 18 |
| - TAPAS LATERALES Y CIERRES | | LAMINA GALVANIZADA CAL. 20, CAL. 18 |
| - AISLAMIENTO INTERIOR | | AEROCOR REFORZADO 1" ESPESOR |
| - PINTURA EXTERIOR | | EN POLVO HORNEABLE POLIESTER GRIS SATINADO |
| - DRENAJE | | 3/4"Ø NPT (HEMBRA) |
| - CONEX. ELECTRICAS | | 1 1/2"Ø CONDUIT |






NOTAS.

- TODAS LAS DIMENSIONES ESTAN DADAS EN PULGADAS A MENOS QUE SE INDIQUE OTRA COSA
- DIMENSIONES SUJETAS A CAMBIO SIN PREVIO AVISO

| REV. | FECHA: | REVISION | CH'DO | AP'DO |
|---|---|---|---|---|
| | | | | |
| | | | | |
| 0 | 22/10/2014 | EDITADO PARA FABRICACION | | |

| | |
|---|---|
| CALIBRE: | |
| MATERIAL: | |
| ACABADO: | |
| PEPS: | |
| APROBACIONES: | |
| DIBUJÓ: | D. CABARCAS |
| REVISÓ: | HERIBERTO ASIS |
| APOB: | . |
| FECHA: | 07/04/2014 |

REFERENCIA:

**UCC08EVAX3-R410A**

( DESCARGA SUPERIOR )

230V/3F/60Hz

DESCRIPCION:

CENTRO DE COMPUTO
CONDENSACION POR AIRE
DIMENSIONES EXT. Y HOJA DE DATOS

CONFORTFRESH® AIR CONDITIONING

| | |
|---|---|
| PEDIDO Nº: | CLIENTE: |
| ESCALA: SIN ESCALA | LTDA |
| HOJA: 1 DE 1 | PLANO Nº: 0828B-100-01 |
| FORMATO : . | |

# 17.- DIAGRAMAS ELECTRICOS

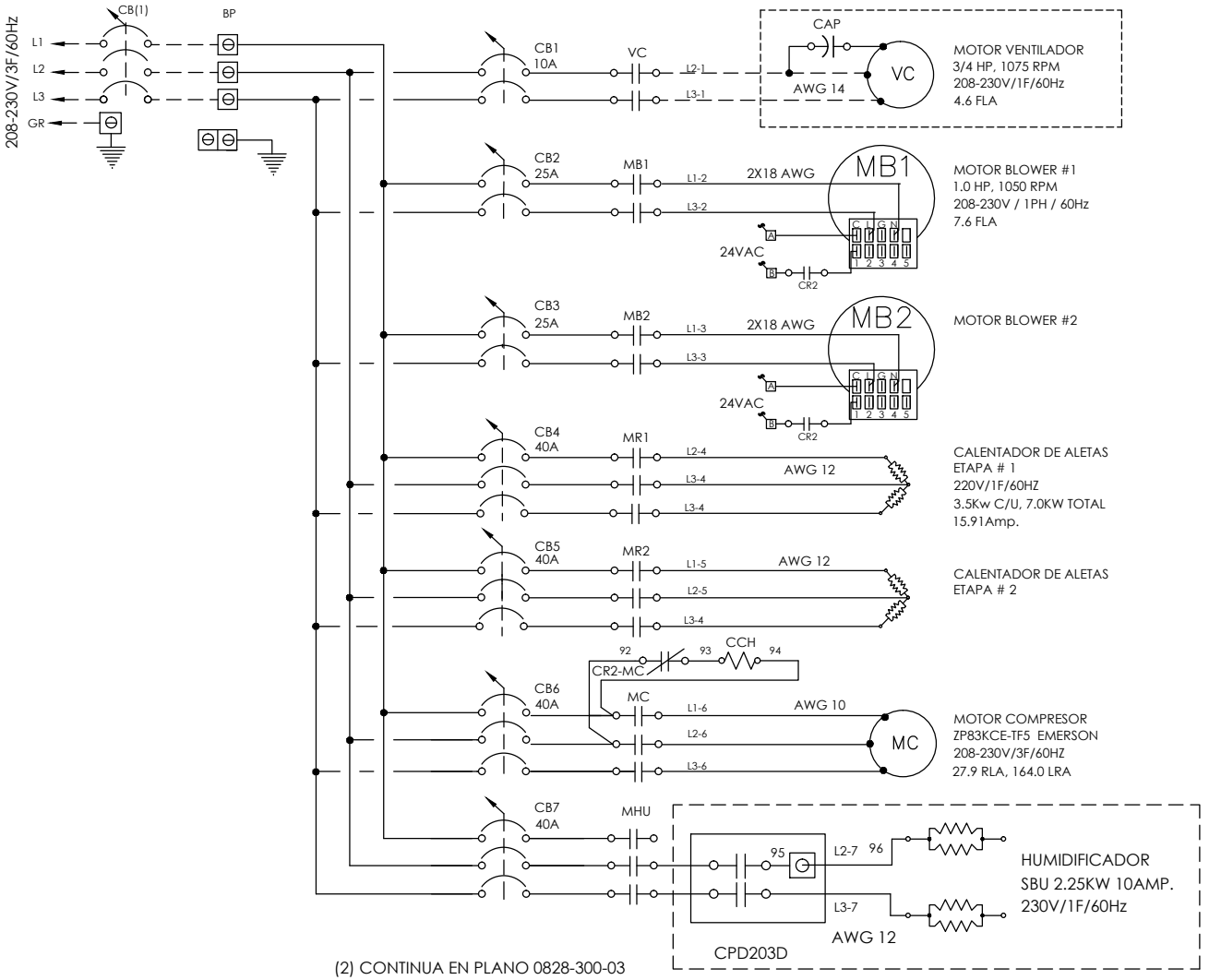
## CONVENCIONES:

| | |
|---|---|
| CB | : BREAKER TERMOMAGNETICO |
| BP | : BORNERA DE POTENCIA |
| MR | : CONTACTOR CALENTADOR |
| SS | : INTERRUPTOR |
| FU | : FUSIBLE |
| CAP | : CAPACITOR |
| SFS | : INTERRUPTOR DE FILTRO SUCIO |
| SF | : SENSOR FUEGO |
| SBU | : UNIDAD GENERADORA DE VAPOR |
| SH | : INTERRUPTOR DETECTOR DE HUMO |
| MHU | : CONTACTOR HUMIDIFICADOR |
| MB | : CONTACTOR BLOWER |
| MV | : CONTACTOR MOTOR VENTILADOR |
| PF | : PROTECTOR DE FASES |
| TR | : TRANSFORMADOR |
| IPMB | : INTERRUPTOR DE FLUJO DE AIRE |
| SAT | : INTERRUPTOR ALTA TEMPERATURA |
| PL | : PILOTO ROJO ADVERTENCIA. |
| SSR | INTERRUPTOR REMOTO |
| LS | : ELECTRODOS MÁXIMO NIVEL |
| CS | : ELECTRODOS DE MEDIR CONDUCTIVIDAD |
| DVS | : SOLENOIDE VÁLVULA DRENAJE |
| SVS | : SOLENOIDE VÁLVULA DE LLENADO |
| E C A | : ELECTRODOS 3/6 EN MODELO DE 3 FASES |
| STH | : SENSOR TEMPERATURA Y HUMEDAD |
| CR | : RELEVO |
| SAP | : SENSOR AGUA PISO |
| LP | : INTERRUPTOR BAJA PRESIÓN |
| HP | : INTERRUPTOR ALTA PRESIÓN |
| LSS | : SOLENOIDE |
| ☐ | : BORNERA DE INTERCONEXION |
| --- | : CABLEADO EN OBRA |
| —— | : DELIMITACION EQUIPO |

## NOTAS:

(1) SUMINISTRO E INSTALACION POR OTROS

(2) CONTINUA EN PLANO 0828-300-03




(2) CONTINUA EN PLANO 0828-300-03

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 0 | 11/11/2014 | EDITADO PARA FABRICACIÓN. | | | | | |

| | |
|---|---|
| CALIBRE: | |
| MATERIAL: | |
| ACABADO: | |
| PEPS: | |
| APROBACIONES: | |
| DIBUJÓ: | CARLOS MEJIA |
| REVISÓ: | HERIBERTO ASIS |
| APOB: | . |

REFERENCIA:

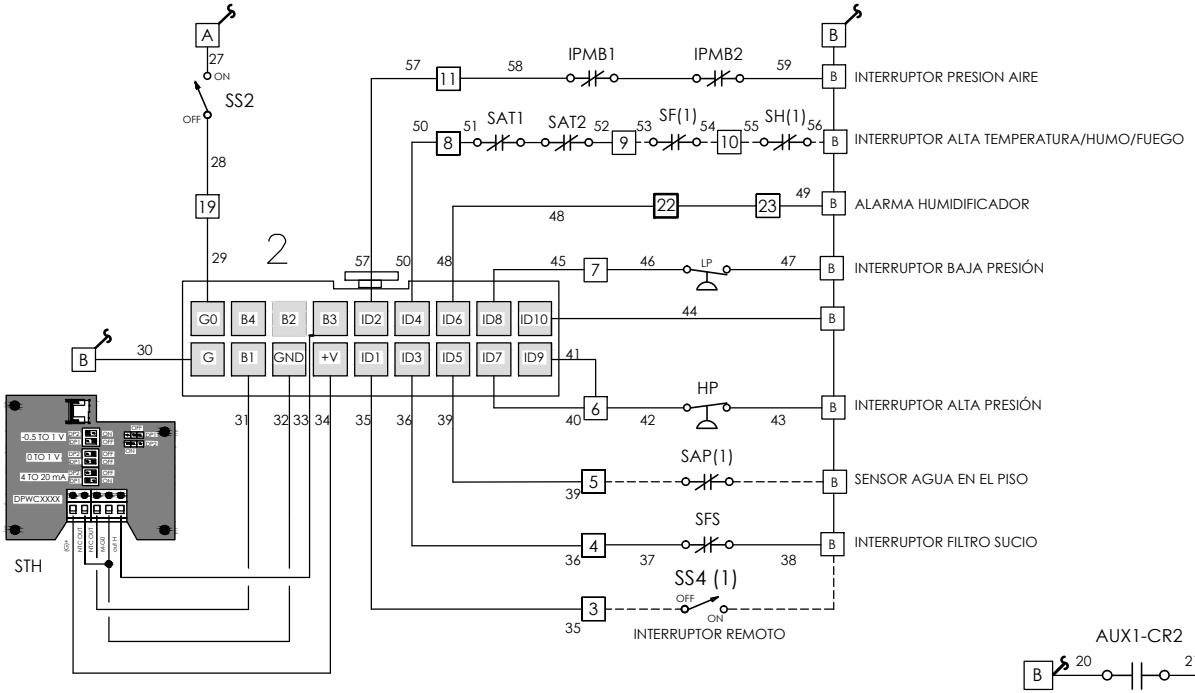
# UCC08EVAX3
## 208-230V/3F/60Hz

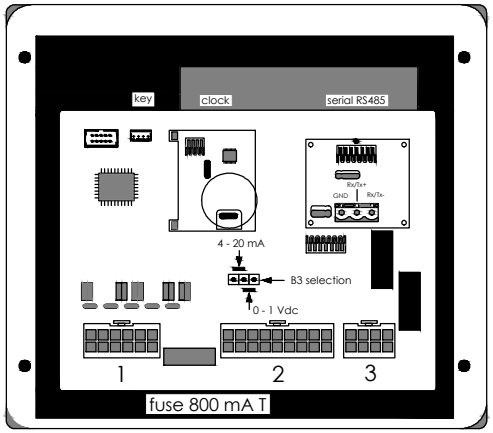
CONFORTFRESH® AIR CONDITIONING

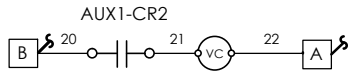
DESCRIPCION:

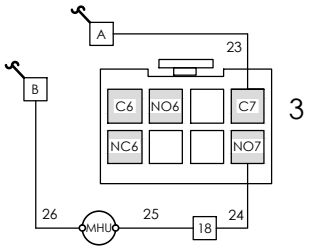
DIAGRAMA ELÉCTRICO
CENTRO DE COMPUTO 8.0 TR

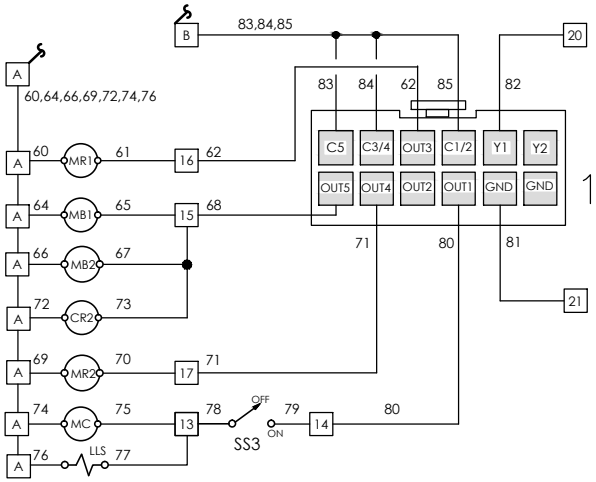
| | |
|---|---|
| PEDIDO Nº: | CLIENTE: |
| ESCALA: SIN ESCALA | |
| HOJA: 1 DE 4 | PLANO Nº: 0828B-300-01 |
| FORMATO : | |

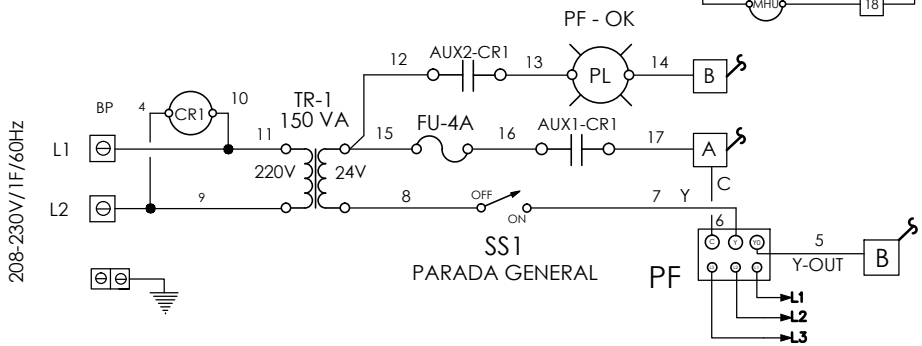


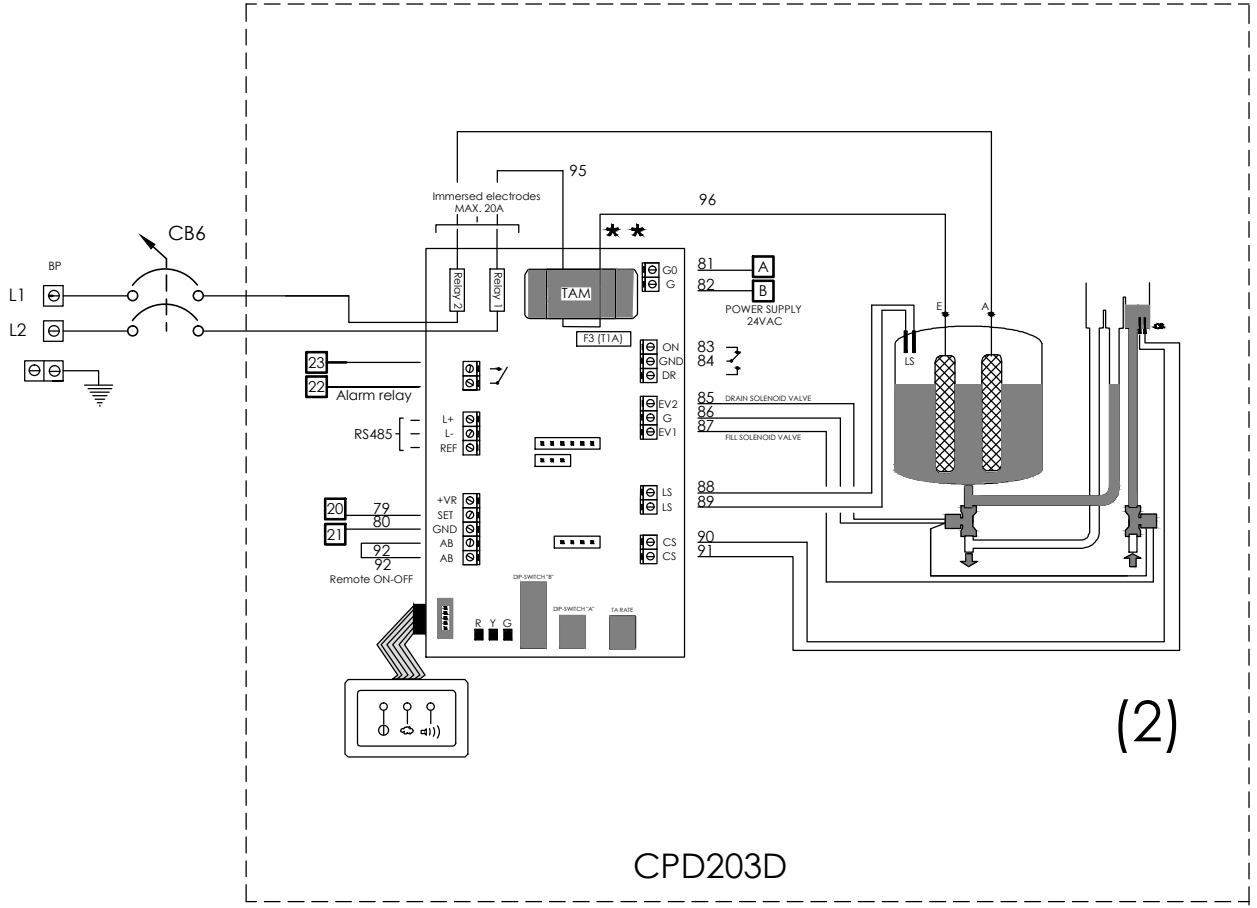




| | | | | | | |
|---|---|---|---|---|---|---|
| | | | CALIBRE: | | REFERENCIA: UCC08EVAX3 208-230V/3F/60Hz | CONFORTFRESH® AIR CONDITIONING |
| | | | MATERIAL: | | | |
| | | | ACABADO: | | | |
| | | | PEPS: | | | |
| | | | APROBACIONES: | | | |
| | | | DIBUJÓ: | CARLOS MEJIA | DESCRIPCION: DIAGRAMA ELECTRICO CENTRO DE COMPUTO 8.0 TR | PEDIDO Nº: / CLIENTE: |
| | | | REVISÓ: | HERIBERTO ASIS | | ESCALA: SIN ESCALA |
| 1 | 16/01/2015 | EDITADO EN CONEXIÓN DE BOBINA CONTACTOR MOTOR CONDENSADOR | APOB: | . | | HOJA: 2 DE 4 / PLANO Nº: 0828B-300-02 |
| 0 | 11/11/2014 | EDITADO PARA LA FABRICACION | | | | FORMATO : |

## CONVENCIONES:

| | |
|---|---|
| CB | : BREAKER TERMOMAGNETICO |
| BP | : BORNERA DE POTENCIA |
| MR | : CONTACTOR CALENTADOR |
| SS | : INTERRUPTOR |
| FU | : FUSIBLE |
| CAP | : CAPACITOR |
| SFS | : INTERRUPTOR DE FILTRO SUCIO |
| SF | : SENSOR FUEGO |
| SBU | : UNIDAD GENERADORA DE VAPOR |
| SH | : INTERRUPTOR DETECTOR DE HUMO |
| MHU | : CONTACTOR HUMIDIFICADOR |
| MB | : CONTACTOR BLOWER |
| MV | : CONTACTOR MOTOR VENTILADOR |
| PF | : PROTECTOR DE FASES |
| TR | : TRANSFORMADOR |
| IPMB | : INTERRUPTOR DE FLUJO DE AIRE |
| SAT | : INTERRUPTOR ALTA TEMPERATURA |
| PL | : PILOTO ROJO ADVERTENCIA. |
| SSR | INTERRUPTOR REMOTO |
| LS | : ELECTRODOS MÁXIMO NIVEL |
| CS | : ELECTRODOS DE MEDIR CONDUCTIVIDAD |
| DVS | : SOLENOIDE VÁLVULA DRENAJE |
| SVS | : SOLENOIDE VÁLVULA DE LLENADO |
| E C A | : ELECTRODOS 3/6 EN MODELO DE 3 FASES |
| STH | : SENSOR TEMPERATURA Y HUMEDAD |
| CR | : RELEVO |
| SAP | : SENSOR AGUA PISO |
| LP | : INTERRUPTOR BAJA PRESIÓN |
| HP | : INTERRUPTOR ALTA PRESIÓN |
| LSS | : SOLENOIDE |
| □ | : BORNERA DE INTERCONEXION |
| --- | : CABLEADO EN OBRA |
| —— | : DELIMITACION EQUIPO |




CPD203D

## NOTAS:

(1) SUMINISTRO E INSTALACION POR OTROS

(2) CONTINUACIÓN PLANO 0828-300-01

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | CALIBRE: | | REFERENCIA: UCC08EVAX3 208-230V/3F/60Hz |
| | | | | | MATERIAL: | | |
| | | | | | ACABADO: | | |
| | | | | | PEPS: | | |
| | | | | | APROBACIONES: | | |
| | | | | | DIBUJÓ: | CARLOS MEJIA | DESCRIPCION: DIAGRAMA ELECTRICO CENTRO DE COMPUTO 8.0TR |
| | | | | | REVISÓ: | HERIBERTO ASIS | |
| 0 | 11/11/2014 | EDITADO PARA FABRICACION | | | APOB: | . | |

CONFORTFRESH® AIR CONDITIONING

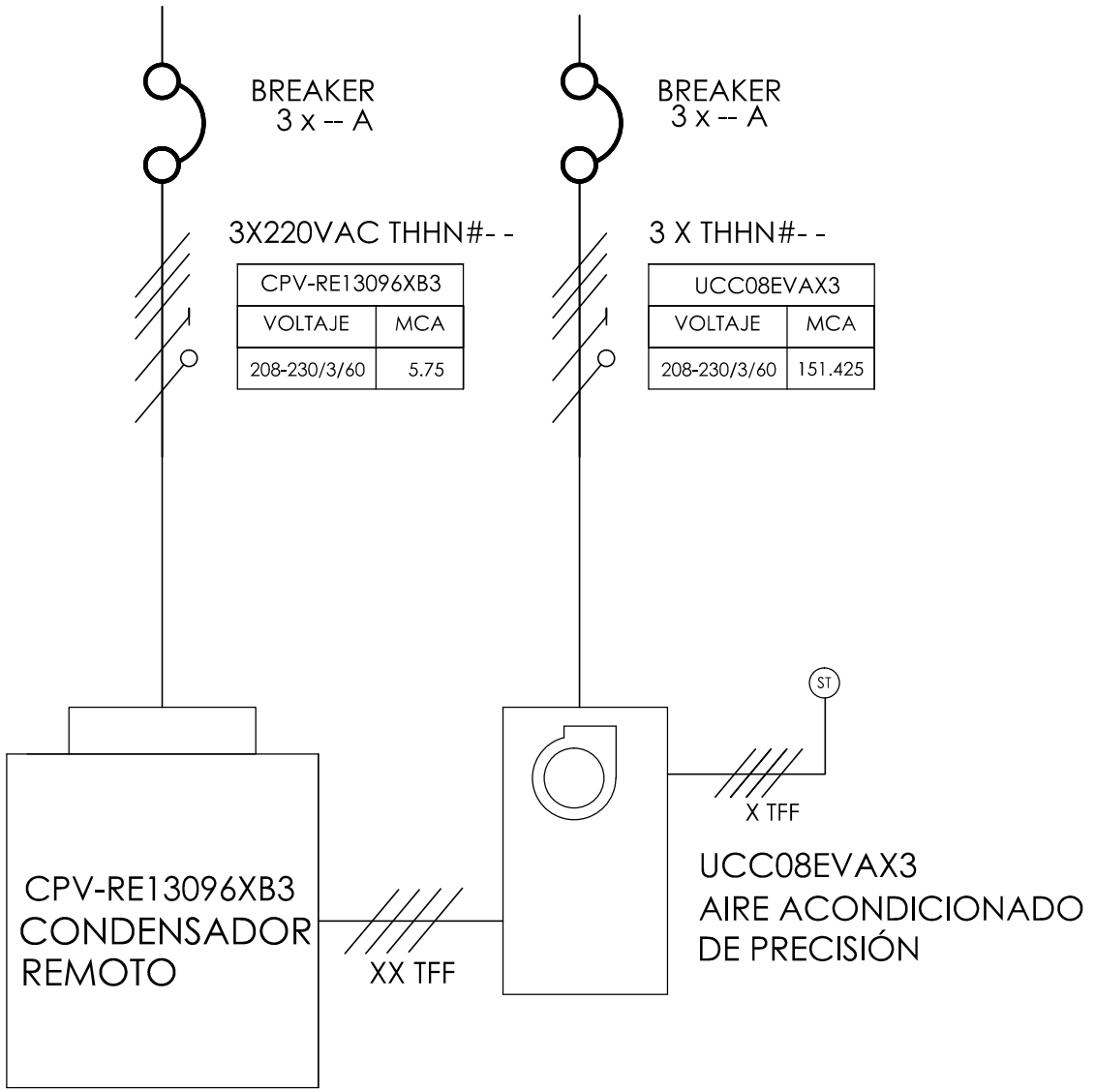
| | |
|---|---|
| PEDIDO Nº: | CLIENTE: |
| ESCALA: SIN ESCALA | |
| HOJA: 3 DE 4 | PLANO Nº: 0828B-300-03 |
| FORMATO : | |

## UCC08EVAX3

| CALENTADOR ALETAS | |
|---|---|
| cant. 4 | FLA 15.91 |
| COMPRESOR | RLA 27.9 |
| cant. 1 | LRA 164.0 |
| MOTOR EVAPORADOR | |
| cant. 2 | FLA 7.6 |
| HUMIDIFICADOR | |
| cant. 1 | FLA 10 |

## CPV-RE13096XB3

| MOTOR CONDENSADOR | |
|---|---|
| cant. 1 | FLA 4.6 |




NOTAS:

(1) SUMINISTRO E INSTALACION POR OTROS

(2) COMPONENTE OPCIONAL NO INCLUIDO

| | |
|---|---|
| CALIBRE: | |
| MATERIAL: | |
| ACABADO: | |
| PEPS: | |
| APROBACIONES: | |

REFERENCIA:

# UNIFILAR
208-230V/3F/60Hz

CONFORTFRESH® AIR CONDITIONING

| REV. | FECHA: | REVISION | CH'DO | AP'DO |
|---|---|---|---|---|
| 0 | 28/08/2014 | EDITADO PARA FABRICACION | | |

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| APOB: | . |
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DESCRIPCION:
DIAGRAMA ELECTRICO UNIFILAR
AIRE ACONDICIONADO DE PRECISIÓN

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| PEDIDO Nº: | CLIENTE: |
| ESCALA: SIN ESCALA | |
| HOJA: 1 DE 4 | PLANO Nº: 0828B-300-04 |
| FORMATO : . | |

# 18.- MANUAL DEL CONTROLADOR

**µAC Controllore per armadi di condizionamento**
***µAC Electronic control for air-conditioning units***

µAC

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

# Manuale d'uso

# *User manual*

CAREL

Technology & Evolution

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# 1. Caratteristiche generali

## 1.1 Descrizione generale

**µAC** è un controllo elettronico per la completa gestione dei condizionatori di precisione, sia nelle versioni ad espansione diretta (con 1 o 2 compressori), con 1 o 2 resistenze o con batterie (valvola sulla batteria calda e/o valvola sulla batteria fredda). Consente anche di gestire un umidificatore (con controllo di tipo CDA o Humicontrol) e la deumidificazione con varie configurazioni preimpostabili. Inoltre, può essere impiegato anche negli armadi per "Shelters" con la gestione del ventilatore del condensatore.

**Funzioni principali:**
- Controllo sulla temperatura e umidità dell'aria di ripresa
- Risparmio energetico con free-cooling (Shelters) o compensazione
- Gestione della deumidifica
- Controllo della velocità del ventilatore di mandata
- Completa gestione degli allarmi con lo storico
- Rotazione di più unità
- Fasce orarie
- Collegabile a linea seriale per supervisione / teleassistenza

**Dispositivi controllati:**
- 1 o 2 compressori o valvola per batteria di raffreddamento
- 1 o 2 resistenze o valvola per batteria di riscaldamento
- Ventilatore di mandata in ON-OFF o proporzionale
- Umidificatore con uscita proporzionale o ON-OFF
- Deumidifica con uscita ON-OFF
- Dispositivo d'allarme

**Opzioni:**
- Scheda seriale RS485
- Scheda orologio con memoria per lo storico degli allarmi e fasce orarie
- Moduli per il controllo ventilatori
- Chiave di programmazione

**Programmazione:**
Tutti i parametri della macchina sono configurabili non solo tramite la tastiera posta sul frontale ma anche da una chiave hardware e/o da linea seriale.

# 2. Interfaccia utente µAC

Il µAC è costituito da un display e da una scheda di potenza, inseriti assieme in un unico contenitore, vedi Fig. 1.

# *1. General characteristics*

## *1.1 General description*

*The **µAC** is an electronic control for the complete management of precision air-conditioners, both in direct expansion versions (with 1 or 2 compressors), with 1 or 2 heating elements or with batteries (valve on the heating battery and/or valve on the cooling battery). The control also allows the management of a humidifier (with CDA type control or Humicontrol) and dehumidification with various pre-settable configurations. In addition, it can also be used in precision units for "Shelters" with management of the condenser fan.*

***Main functions:***
- *Control based on the temperature and humidity of the inlet air*
- *Energy saving with free-cooling (Shelters) or compensation*
- *Dehumidification management*
- *Control of the supply fan speed*
- *Complete alarm management with log*
- *Rotation of a series of units*
- *Time bands*
- *Can be connected to a serial line for supervisor / telemaintenance*

***Controlled devices:***
- *1 or 2 compressors or valve for cooling battery*
- *1 or 2 heating elements or valve for heating battery*
- *Supply fan in ON-OFF or proportional mode*
- *Humidifier with proportional or ON-OFF output*
- *Dehumidification with ON-OFF output*
- *Alarm device*

***Options:***
- *RS485 serial board*
- *Clock board with memory for logging the alarms and time bands*
- *Fan control modules*
- *Programming key*

***Programming:***
*All the machine parameters can be configured not only using the keypad located on the front panel, but also using a hardware key and/or via serial line.*

# *2. µAC user interface*

*The µAC is made up of a display and a power board, installed together in the same case, see Fig. 1.*

**Fig. 1**

## 2.1 Il display

Il display permette di visualizzare le principali grandezze monitorate e lo stato della macchina e degli attuatori.

## *2.1 The display*

*The display shows the main measurements monitored and the status of the machine and the actuators.*

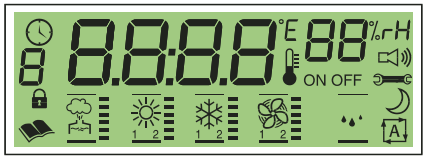



**Fig. 2**

Di seguito vengono riportati i simboli e le scritte visualizzabili dal display, con il relativo significato.

**N. B. La Fig. 2 illustra tutti i simboli e le scritte visualizzabili dal display, situazione, che si verifica allo start del regolatore.**

*Following is a description of the symbols and the messages shown on the display, and the corresponding meaning.*

***N.B. Fig. 2 illustrates all the symbols and the messages shown on the display; this occurs on starting the regulator.***

| | |
|---|---|
| 8.8.8.8 | temperatura ambiente<br>in prog. visualizza il valore del parametro |
| °C o °F | unità di misura temperatura: gradi Centigradi/Fahrenheit |
| 88 | umidità ambiente<br>in programmazione visualizza il n. del parametro |
| %rH | unità di misura umidità relativa |
| | buzzer attivo |
| | superamento limite contaore |
| | stato Off da fasce orarie |
| | fasce orarie attive |
| ON OFF | stato contatto esterno:<br>- ON - abilitazione macchina<br>- OFF - macchina in stand-by |
| | **indica che il valore visualizzato è la temperatura**<br>(senza questo simbolo acceso si visualizza il Set-point) |
| | fascia oraria selezionata |
| | deumidifica attiva |
| 1 2 | ventilazione attiva : % velocità fan |
| 1 2 | cooling attivo:<br>- numero (1 o 2) attuatori freddo; % apertura valvola freddo, oppure (**in modalità shelter**) % apertura serranda free cooling |
| 1 2 | heating attivo:<br>- numero (1 o 2 ) attuatori caldo<br>- % apertura valvola |
| | umidificazione attiva: % produzione vapore |
| | fase di programmazione |
| | - impostazione password<br>- blocca modifica parametri |
| 8 | (**in funzione orologio)** giorno della settimana |
| | - visualizzazione orologio<br>- Set-Up orologio |

| | |
|---|---|
| 8.8.8.8 | *ambient temperature*<br>*in prog. displays the value of the parameter* |
| °C or °F | *temp. unit of measure: degrees Centigrade/Fahrenheit* |
| 88 | *ambient humidity*<br>*in programming displays the no. of the parameter* |
| %rH | *relative humidity unit of measure* |
| | *buzzer active* |
| | *hour counter limit exceeded* |
| | *OFF status from time bands* |
| | *time bands active* |
| ON OFF | *external contact status:*<br>*- ON - machine enabled*<br>*- OFF - machine in stand-by* |
| | ***indicates that the value displayed is the temperature***<br>*(with this symbol off the Set-point is displayed)* |
| | *time band selected* |
| | *dehumidification active* |
| 1 2 | *ventilation active : % fan speed* |
| 1 2 | *cooling active:*<br>*- number (1 or 2) cooling actuators; % opening cooling valve, or (**in shelter mode**) % opening free cooling damper* |
| 1 2 | *heating active:*<br>*- number (1 or 2 ) heating actuators*<br>*- % opening valve* |
| | *humidification active: % steam production* |
| | *programming phase* |
| | *- password setting*<br>*- parameter modification blocked* |
| 8 | *(in clock function) day of the week* |
| | *- clock display*<br>*- clock set-up* |

## 2.2 Le indicazioni di funzionamento

I principali stati del regolatore (presenza alimentazione, allarme attivo e stato ingresso On/Off remoto) vengono mostrati all'utente tramite 3 LED presenti sul frontale.

**Fig. 3**

**Significato LED (Fig. 3)**

**LED line (giallo):** controllo alimentato

**LED alarm (rosso):** macchina in allarme (il simbolo , sirena, sul display si accende solo con cicalino attivo)

**LED On (verde):** macchina in On da tastiera o da supervisore (si riferisce alla variabile Eeprom).
Lo stato di On effettivo della macchina può dipendere, inoltre, dall'ingresso digitale ON-OFF, dalla fascia oraria attiva, dalla condizione di stand-by trasmessa dall'unità master (se più unità in rotazione), ed è indicato dall'accensione del simbolo del ventilatore.
**I simboli ON-OFF sul Display si accendono solo con l'ingresso del contatto remoto abilitato ed indicano lo stato del contatto. stesso.**

## *2.2 Status indicators*

*The main states of the regulator (power supply present, alarm active and remote ON/OFF input status) are displayed to the user through 3 LEDs on the front panel.*

***Meaning of the LED (Fig. 3)***

***Line LED (yellow):*** *control powered*

***Alarm LED (red):*** *machine alarm (the siren symbol on the display is on only when the buzzer is active)*

***ON LED (green):*** *machine ON from keypad or supervisor (referred to the EEPROM variable). The effective ON status of the machine may, in addition, depend on the ON-OFF digital input, on the active time band, the stand-by condition transmitted from the master unit (if a series of units is in rotation), and is indicated by the illumination of the fan symbol.*
***The ON-OFF symbols on the Display are illuminated only when the input of the remote contact is enabled and indicate the status of such contact.***

## 2.3 La tastiera

## *2.3 The keypad*

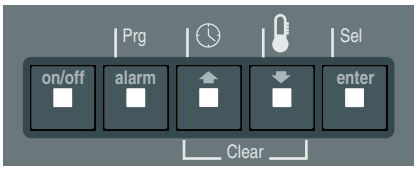



**Fig. 4**

Il significato dei tasti è il seguente:

[on/off] - Commuta stato: se la macchina è accesa, una pressione del tasto la pone in Standby; viceversa, viene riattivata.

[alarm] - Premuto per 5 s permette di accedere ai parametri User.
- In presenza di allarme tacita il cicalino.

[▲] - Pressioni successive visualizzano, ciclicamente: l'ora corrente, la data e la temperatura dell'aria in ambiente.
- In fase di programmazione permette di scorrere o incrementare il valore dei parametri.

[▼] - Tenuto premuto visualizza il set-point.
- In fase di programmazione permette di scorrere o diminuire il valore dei parametri.

[enter] - Premuto per 5 s permette di accedere ai parametri Direct.
- In fase di programmazione permette di modificare il valore del parametro selezionato (vedi par. 5.2 - Modifica parametri)

[alarm] + [enter] Premuti assieme per 5 s permettono di accedere ai parametri Factory.

[▲] + [▼] Premuti assieme per 2 s permettono di resettare gli allarmi.

*The buttons have the following meanings:*

[on/off] *- Commutes status: if the machine is on, one press of the button places it in Standby; vice-versa, it is re-enabled.*

[alarm] *- Pressed for 5 secs accesses the User parameters.*
*- In the presence of an alarm silences the buzzer.*

[▲] *- Repeated pressing displays, cyclically: the current time, date and the temperature of the air in the room.*
*- In programming phase scrolls or increases the value of the parameters.*

[▼] *- Held pressed displays the set-point.*
*- In programming phase scrolls or decreases the value of the parameters.*

[enter] *- Pressed for 5 secs accesses the Direct parameters.*
*- In programming phase modifies the value of the selected parameter (see par. 5.2 - Parameter modification)*

[alarm] + [enter] *Pressed together for 5 secs access the Factory parameters.*

[▲] + [▼] *Pressed together for 2 secs reset the alarms.*

## 3. Installazione

### 3.1 Avvertenze

Evitare l'installazione dei controlli in ambienti con le seguenti caratteristiche:
- umidità relativa maggiore dell'80%;
- forti vibrazioni o urti;
- esposizioni a continui getti d'acqua;
- esposizione ad atmosfere aggressive ed inquinanti (es: gas solforici e ammoniacali, nebbie saline, fumi) per per evitare corrosione e/o ossidazione;
- alte interferenze magnetiche e/o radiofrequenze (evitare quindi l'installazione delle macchine vicino ad antenne trasmittenti);
- esposizioni dei controlli all'irraggiamento solare diretto e agli agenti atmosferici in genere.

Nel collegamento del regolatore:
- utilizzare capicorda adatti per i morsetti in uso;
- separare quanto più possibile i cavi delle sonde e degli ingressi digitali dai cavi dei carichi induttivi e di potenza per evitare possibili disturbi elettromagnetici;
- non inserire mai nelle stesse canaline (comprese quelle dei quadri elettrici) cavi di potenza con cavi sonde, ingressi digitali e di collegamento seriale; non fissare insieme i cavi.
- evitare, inoltre, che i cavi delle sonde siano installati nelle immediate vicinanze di dispositivi di potenza (contattori, interruttori magneto termici, ecc.);

**Attenzione: il non corretto allacciamento della tensione di alimentazione può danneggiare seriamente il sistema.**
**L'utilizzo del regolatore elettronico non esime dal predisporre sull'unità tutti i dispositivi elettromeccanici utili per garantire la sicurezza dell'impianto.**

### 3.2 Protezione contro le scosse elettriche

- Il trasformatore di alimentazione deve essere di sicurezza perchè l'isolamento tra morsetti di alimentazione e l'uscita seriale RS485 è solo funzionale.
- Togliere alimentazione prima di intervenire sulla scheda in fase di montaggio, manutenzione o sostituzione.
- Fascettare i cavi in modo che il distacco accidentale di un conduttore in tensione non comprometta la sicurezza.
- Il sistema composto da MAC2000A00, MAC2SER000, MAC2CLK000, MCHRTF***0 costituisce un dispositivo di comando da incorporare in apparecchiature in classe I o II. La classe relativa alla protezione contro le scosse elettriche dipende dalla modalità con cui viene eseguita l'integrazione del dispositivo di comando nella macchina realizzata dal costruttore.
- La protezione contro i cortocircuiti, per cablaggi diffettosi deve essere garantita dal costruttore dell'apparecchiatura in cui il dispositivo di comando viene incorporato.

### 3.3 Istruzioni per il montaggio

Il regolatore µAC è progettato per montaggio a pannello.
La dima di foratura deve avere le dimensioni di 173x154 mm (vedi fig. 40 pag. 44).
Per l'installazione seguire le istruzioni riportate di seguito:
- asportare la cornice esterna a scatto;
- inserire la parte plastica contenente il regolatore sulla parete forata anteriore del pannello, facendo attenzione che la guarnizione sul lembo inferiore del frontale sia bene in appoggio con la parete anteriore del pannello;
- praticare sul pannello 4 fori del diametro di 2.5 mm, in corrispondenza esatta con i fori presenti sullo strumento;
- inserire le viti di fissaggio presenti in dotazione, scegliendo le viti autofilettanti o automaschianti a seconda del materiale del pannello (plastico o metallico).

Per la connessione ai connettori **1, 2, 3** vedi fig. 5 utilizzare i connettori femmina Molex™ Mini Fit a 12, 18 e 8 vie, vedi cap. 10.

## *3. Installation*

### *3.1 Warnings*

*Avoid installing the controls in environments with the following characteristics:*
- *relative humidity greater than 80%;*
- *heavy vibrations or knocks;*
- *exposure to continuous spray of water;*
- *exposure to aggressive and polluting atmospheres (e.g.: sulphuric and ammonia gases, saline mist, smoke) to avoid corrosion and/or oxidation;*
- *high levels of magnetic and/or radio-frequency interference (thus avoid installing the machine near transmitting antennas);*
- *exposure to direct sunlight and atmospheric agents in general.*

*When connecting the regulator:*
- *use cable ends suitable for the terminals being used;*
- *separate as far as possible the probe cables and the digital input cables from cables with inductive loads and power cables, to avoid any electromagnetic disturbance;*
- *never place power cables and probe cables, serial and digital input cables in the same channels (including those in the electrical panels) avoid to fix togheter cables;*
- *avoid, in addition, the probe cables being installed close to power devices (contactors, thermal overload switches, etc.);*

***Attention: incorrect connection of the power supply may seriously damage the system. The use of the electronic regulator does not preclude the provision on the unit of all the electromechanical devices required to guarantee the safety of the system.***

### *3.2 Protection against electric shock*

- *The power supply must feature a safety transformer, as the insulation between the terminals of the power supply and the RS485 serial output is functional only.*
- *Disconnect the power supply before operating on the board during mounting, maintenance or replacement.*
- *Clamp the cables so that the accidental removal of a live wire does not affect the safety of the device.*
- *The system made up of MAC2000A00, MAC2SER000, MAC2CLK000, MCHRTF***0 represents a control device to be incorporated into class I or II appliances. The category of protection against electric shock depends on the way in which the control device is integrated into the machine made by the manufacturer.*
- *Protection against short-circuits in the case of defective wiring must be guaranteed by the manufacturer of the machine in which the control device is incorporated.*

### *3.3 Mounting instructions*

*The µAC regulator is designed for panel mounting.*
*The drilling template must measure 173x154mm (see fig. 40 p. 44).*
*Follow the instructions below for installation:*
- *remove the external clip-on frame;*
- *insert the plastic part containing the regulator on the drilled front face of the panel, making sure that the gasket on the lower edge of the front panel rests properly against the front face of the panel;*
- *make 4 holes, 2.5mm in diameter, in the panel at the points corresponding exactly to the holes on the instrument;*
- *insert the fastening screws supplied, choosing self-threading or self-tapping screws according to the material of the panel (plastic or metal).*

*To connect the connectors **1**, **2**, **3**, see Fig. 5, use Molex™ Mini Fit 12, 18 and 8 way female connectors, see chap. 10.*

### 3.4 Procedura di primo avviamento

Per l'installazione del controllo procedere come indicato di seguito, tenendo presente gli schemi di collegamento riportati.

1. collegare sonde ed alimentazione: le sonde possono essere remotate fino ad una distanza massima di 50 metri dal controllo purché si usino cavi con sezione minima di 1 $mm^2$; per migliorare l'immunità ai disturbi si consiglia di usare cavi schermati (collegare un solo estremo dello schermo alla terra del quadro elettrico).
2. Programmare lo strumento: per una descrizione più approfondita vedere il capitolo 5 "Programmazione".
3. Collegare gli attuatori: è preferibile collegare i connettori 1 e 3, solo dopo aver programmato il controllo.
   Al riguardo si raccomanda di non collegare carichi superiori alla portata dei relè.

### 3.5 La scheda I/O (Input/Output)

In Fig. 5 è rappresentata la scheda I/O.
Con riferimento a tale figura si vedono:

- in basso i connettori Molex (1 - 2 - 3), per la realizzazione delle connessioni principali;
- in alto, il 2° connettore maschio da sinistra, per inserire la chiave per programmare il µAC o copiare i dati già presenti;
- la predisposizione per la scheda orologio **(opzionale)** MAC2CLK000;
- la predisposizione per la scheda seriale RS485 **(opzionale)** MAC2SER000;
- al centro della scheda, il jumper per la selezione hardware della sonda B3 (4…20 mA/ 0…1 Vdc), con default 0…1 Vdc.

### *3.4 Initial start-up procedure*

*To install the control, proceed as indicated below, with reference to the connection diagrams provided.*

1. *connect the probes and power supply: the probes can be located up to a maximum distance of 50 metres from the control, using cables with a minimum cross-section of 1$mm^2$; to improve immunity to disturbance it is recommended to use shielded cables (connect one end only of the shield to the ground on the electrical panel).*
2. *Program the instrument: for a more in-depth description see chapter 5, "Programming".*
3. *Connect the actuators: it is suggested to connect connectors 1 and 3 only after having programmed the control.*
   *On this subject, iavoid to connect loads exceeding the relay rating.*

### *3.5 The I/O (Input/Output) board*

*Fig. 5 shows the I/O board.*
*With reference to this figure, we can see:*

- *in the lower part the Molex connectors (1 - 2 - 3), for the main connections;*
- *in the upper part, the 2nd male connector from the left, to insert the key for programming the µAC or copy the existing data;*
- *the fitting for the clock board **(optional)**, MAC2CLK000;*
- *the fitting for the RS485 serial board **(optional)**. MAC2SER000;*
- *in the centre of the board, the jumper for selecting the hardware of probe B3 (4to20mA/ 0to1Vdc), with default 0to1Vdc.*

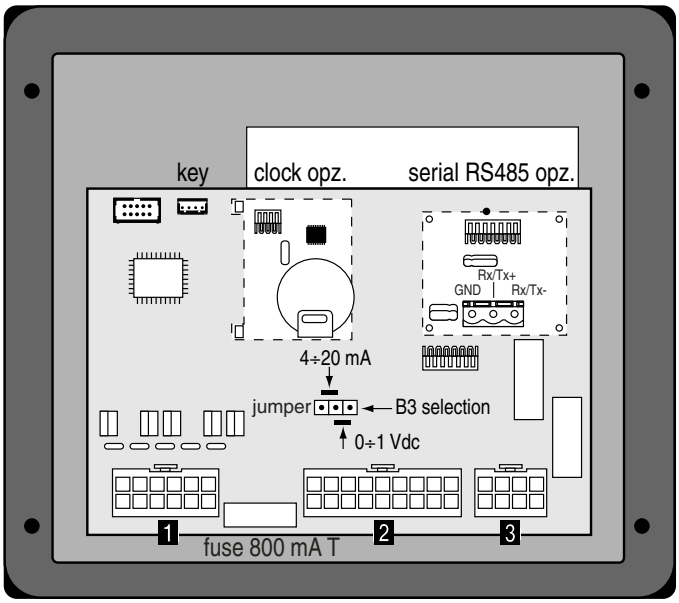



**Fig. 5**

### 3.6 Significato degli ingressi e delle uscite

La tabella seguente (Pag. 6) riporta il significato degli ingressi e delle uscite in funzione del tipo di macchina selezionato.
**CW=** Armadio con batterie di caldo e freddo;
**CW cool/heat=** armadio con un'unica batteria che funziona in caldo o in freddo;
**ED=** armadio ad espansione diretta;
**Shelter=** armadio completo di condensatore e senza umidificatore.

### *3.6 Meaning of the inputs and the outputs*

*The following table (P. 6) describes the meaning of the inputs and the outputs according to the type of machine selected.*
***CW=** Precision unit with cooling and heating batteries;*
***CW cool/heat=** precision unit with one battery only which operates in heating or cooling;*
***ED=** direct expansion precision unit;*
***Shelter=** precision unit complete with condenser and without humidifier.*

## Ingressi e uscite I/O / *Inputs and outputs I/O*

### Ingressi digitali - Connettore 2 / *Digital inputs - Connector 2*

| | CW | CW caldo-freddo / *cool-heat* | ED | Shelters |
|---|---|---|---|---|
| ID1 | On/Off remoto (HE=1)<br>*Remote ON/OFF (HE=1)* | On/Off remoto (HE=1)<br>*Remote ON/OFF (HE=1)* | On/Off remoto (HE=1)<br>*Remote ON/OFF (HE=1)* | On/Off remoto (HE=1)<br>*Remote ON/OFF (HE=1)* |
| ID2 | Flussostato / *Flow controller*<br>Term. vent.1/*Fan1 thermal* (HA=6, 7) | Flussostato / *Flow controller*<br>Term. vent.1/*Fan1 thermal* (HA=6, 7) | Flussostato / *Flow controller*<br>Term. vent.1/*Fan1 thermal* (HA=6, 7) | Flussostato / *Flow controller*<br>Term. vent.1/*Fan1 thermal* (HA=6, 7) |
| ID3 | Filtro sporco */ Filter dirty* | Filtro sporco */ Filter dirty* | Filtro sporco */ Filter dirty* | Filtro sporco */ Filter dirty* |
| ID4 | Sicur. resis. / *Heat. element safety*<br>Allarme fuoco / *Fire alarm* (PE=1)<br>Term. vent.2/*Fan2 thermal* (HA=6, 7) | Sicur. resis. / *Heat. element safety*<br>Allarme fuoco / *Fire alarm* (PE=1)<br>Term. vent.2/*Fan2 thermal* (HA=6, 7) | Sicur. resis. / *Heat. element safety*<br>Allarme fuoco / *Fire alarm* (PE=1)<br>Term. vent.2/*Fan2 thermal* (HA=6, 7) | Sicur. resis. / *Heat. element safety*<br>Allarme fuoco / *Fire alarm* (PE=1)<br>Term. vent.2/*Fan2 thermal* (HA=6, 7) |
| ID5 | All. esterno/ ingresso per rotazione più unità (dipende da Pb-H2-HA)<br>*External alarm/ input for rotation of a series of units (depends on Pb-H2-HA)* | All. esterno/ ingresso per rotazione più unità (dipende da Pb-H2-HA)<br>*External alarm/ input for rotation of a series of units (depends on Pb-H2-HA)* | All. esterno/ ingresso per rotazione più unità (dipende da Pb-H2-HA)<br>*External alarm/ input for rotation of a series of units (depends on Pb-H2-HA)* | All. esterno/ ingresso per rotazione più unità (dipende da Pb-H2-HA)<br>*External alarm/ input for rotation of a series of units (depends on Pb-H2-HA)* |
| ID6 | Allarme umidif. (H8=1)<br>*Humidif. alarm (H8=1)* | Allarme umidif. (H8=1)<br>*Humidif. alarm (H8=1)* | Allarme umidif. (H8=1)<br>*Humidif. alarm (H8=1)* | Allarme mancanza rete<br>*No power alarm* |
| ID7 | | Estate-inverno / *Cooling-heating* | Alta press. C1 / *High press.C1* | Alta press. C1 / *High press.C1* |
| ID8 | | | Bassa press. C1 */ Low press. C1* | Bassa press. C1 */ Low press. C1* |
| ID9 | Allarme flusso acqua (PF=1)<br>*Water fow alarm (PF=1)* | Allarme flusso acqua (PF=1)<br>*Water fow alarm (PF=1)* | Alta press. C2 */ High press. C2*<br>Term. comp. (H5) / *Comp. thermal (H5)* | Termico comp. / *Comp. thermal* |
| ID10 | Termico ventilatore<br>*Fan thermal* | Termico ventilatore<br>*Fan thermal* | Bassa press. C2 / *Low press*<br>Termico ventilatore (H5)<br>*Fan thermal (H5)* | Termico ventilatore<br>*Fan thermal* |

### Ingressi analogici - Connettore 2 / *Analogue inputs - Connector 2*

| | | | | |
|---|---|---|---|---|
| B1 | Temp. ripresa */ Inlet temp.* | Temp. ripresa */ Inlet temp.* | Temp. ripresa */ Inlet temp.* | Temp. ripresa */ Inlet temp.* |
| B2 | Temp. aria esterna per compensazione (/1,Hc)<br>*External air temp. for compensation (/1,Hc)* | Temp. aria esterna per compensazione (/1,Hc)<br>*External air temp. for compensation (/1,Hc)* | Temp. aria esterna per compensazione (/1,Hc)<br>Controllo condens. (/1,Hc,HB)<br>*External air temp. for compensation (/1,Hc)*<br>*Condens. control (/1,Hc,HB)* | Temp. aria esterna per free cooling (/1,Hc)<br>*External air temp. for free cooling (/1,Hc)* |
| B3 | Umidità ambiente (/2 Hd)<br>*Ambient humidity (/2 Hd)* | Umidità ambiente (/2 Hd)<br>*Ambient humidity (/2 Hd)* | Umidità ambiente (/2 Hd)<br>*Ambient humidity (/2 Hd)* | Press. condens. (/2,Hd,Hb)<br>*Condens. press. (/2,Hd,Hb)* |
| B4 | Temp. mandata (/3=1)<br>*Supply temp. (/3=1)* | Temp. mandata (/3=1)<br>*Supply temp. (/3=1)* | Temp. mandata (/3=1)<br>*Supply temp. (/3=1)* | Temp. mandata (/3=1)<br>*Supply temp. (/3=1)* |

### Uscite digitali a SSR - Connettore 1 / *SSR digital outputs - Connector 1*

| | | | | |
|---|---|---|---|---|
| Out1 | Valvola freddo + (H5)<br>*Cooling valve + (H5)* | Valvola freddo/caldo + (H1,H5)<br>*Cool/heat valve + (H1,H5)* | Comp. 1 (H5)<br>*Comp. 1 (H5)* | Comp.<br>*Comp.* |
| Out2 | Valvola freddo - (H5)<br>*Cooling valve - (H5)* | Valvola freddo/caldo - (H1,H5)<br>*Cool/heat valve - (H1,H5)* | Comp. 2 (H5)<br>*Comp. 2 (H5)* | Resistenza<br>*Heating element* |
| Out3 | Valvola caldo + (H6)<br>*Heating valve + (H6)* | Resistenza 1 (H6)<br>*Heating element 1 (H6)* | Resistenza 1 (H6)<br>*Heating element 1 (H6)* | Serranda+(/2, Hc) / *Damper+(/2, Hc)*<br>Serranda On/Off / *Damper ON/OFF* |
| Out4 | Valvola caldo - (H6)<br>*Heating valve - (H6)* | Resistenza 2 (H6)<br>*Heating element 2 (H6)* | Resistenza 2 (H6)<br>*Heating element 2 (H6)* | Serranda - (/2, Hc)<br>*Damper - (/2, Hc)* |
| Out5 | Vent. mandata 1 / *Supply fan 1* | Vent. mandata 1 / *Supply fan 1* | Vent. mandata 1 / *Supply fan 1* | Vent. mandata 1 / *Supply fan 1* |

### Uscite digitali a relè - Connettore 3 / *Relay digital outputs - Connector 3*

| | | | | |
|---|---|---|---|---|
| Out 6 | Allarme (HF) */ Alarm (HF)* | Allarme (HF) */ Alarm (HF)* | Allarme (HF) */ Alarm (HF)* | Allarme (HF) */ Alarm (HF)* |
| Out 7 | Deumidifica/umidifica (HA)<br>*Dehumid./humid. (HA)*<br>Allarme (HA) */ Alarm (HA)*<br>Rotazione (H2) / *Rotation (H2)*<br>Vent. di mandata 2 (HA=6, 7)<br>*Supply fan 2 (HA=6, 7)* | Deumidifica/umidifica (HA)<br>*Dehumid./humid. (HA)*<br>Allarme (HA) */ Alarm (HA)*<br>Rotazione (H2) / *Rotation (H2)*<br>Vent. di mandata 2 (HA=6, 7)<br>*Supply fan 2 (HA=6, 7)* | Deumidifica/umidifica (HA)<br>*Dehumid./humid. (HA)*<br>Allarme (HA) */ Alarm (HA)*<br>Rotazione (H2) / *Rotation (H2)*<br>Vent. di mandata 2 (HA=6, 7)<br>*Supply fan 2 (HA=6, 7)* | Allarme (HA) */ Alarm (HA)*<br>Rotazione (H2) / *Rotation (H2)*<br>Vent. di mandata 2 (HA=6, 7)<br>*Supply fan 2 (HA=6, 7)* |

### Uscite analogiche - Connettore 1 / *Analogue outputs - Connector 1*

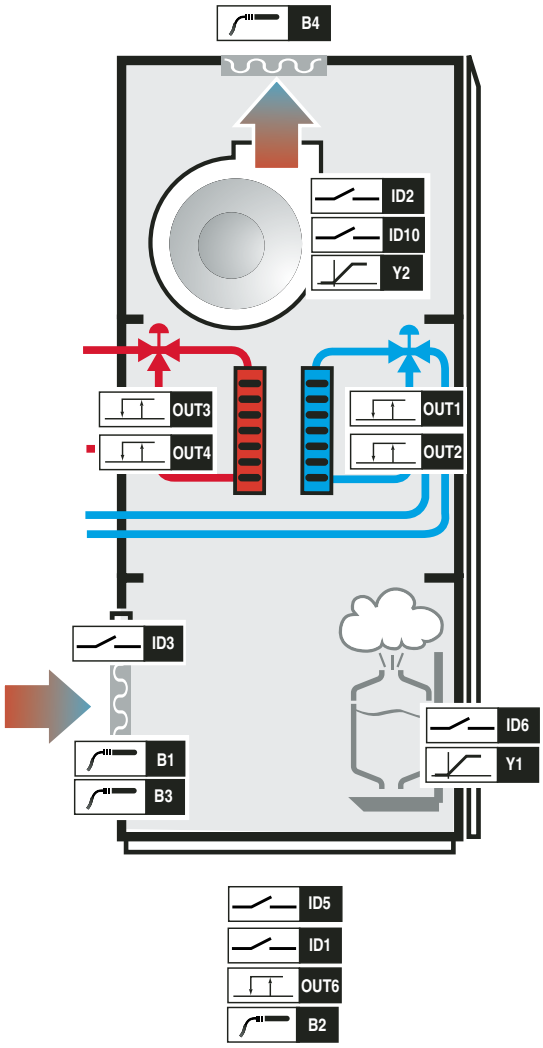
| | | | | |
|---|---|---|---|---|
| Y1 | Controllo umidificatore (/2,H8)<br>*Humidifier control (/2,H8)* | Controllo umidificatore (/2,H8)<br>*Humidifier control (/2,H8)* | Controllo umidificatore (/2,H8)<br>*Humidifier control (/2,H8)* | Uscita serranda (/2,Hc)<br>*Damper output (/2,Hc)* |
| Y2 | Ventilatore mandata (Hb)<br>*Supply fan (Hb)* | Ventilatore mandata (Hb)<br>*Supply fan (Hb)* | Ventilatore mandata/condens.<br>*Supply/condens fan*<br>(/1,/2,Hb,Hc) | Ventilatore condensazione<br>*Condensation fan*<br>(/1,/2,Hb,Hc) |

## 4. Modi di funzionamento

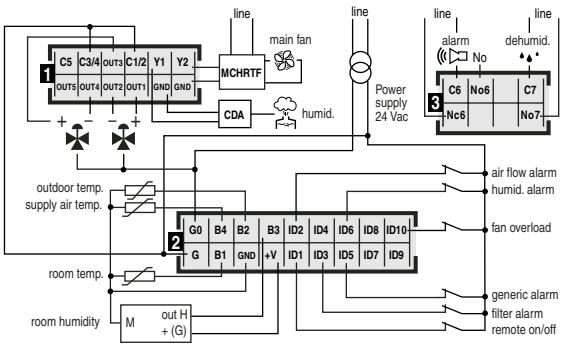
Di seguito vengono riportati alcuni esempi delle macchine nelle principali configurazioni.

### 4.1 Armadio con una batterie (CW)

**Versione CW / *CW version***




**Schema di collegamento / *Connection diagram***




## *4. Operating modes*

Following are descriptions of some examples of the main machine configurations.

### *4.1 Precision unit with batteries (CW)*

**Versione CW caldo-freddo / *CW cooling-heating version***

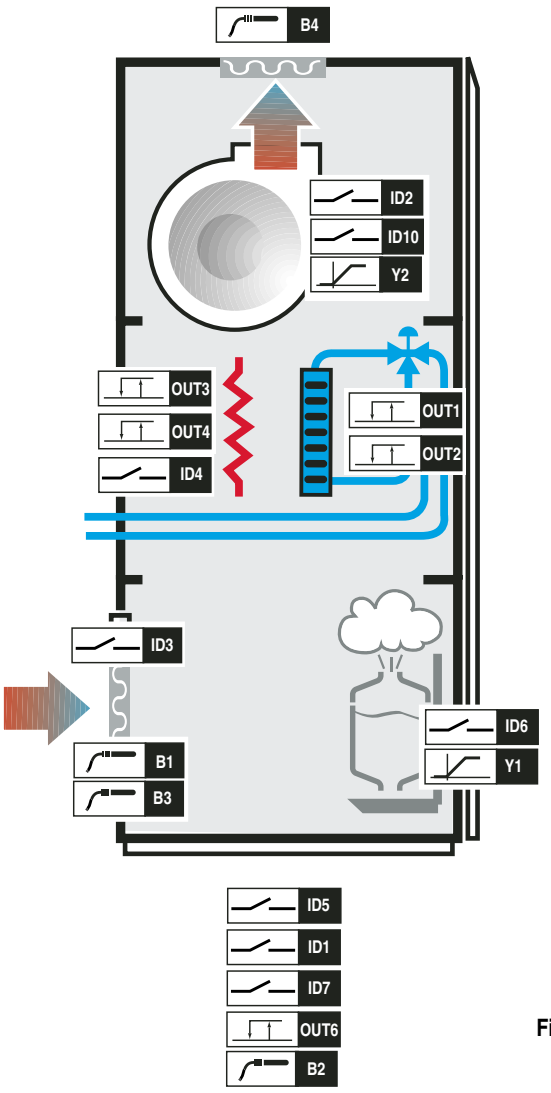



**Fig. 6**

**Schema di collegamento / *Connection diagram***

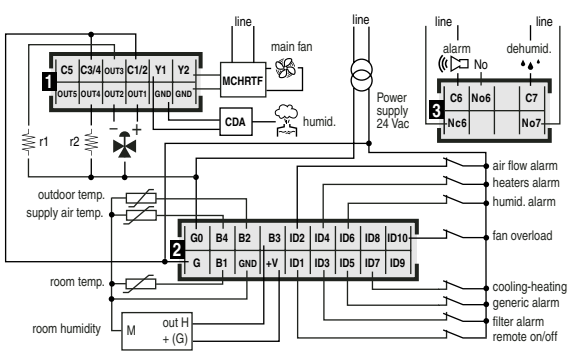



**Fig. 7**

**4.2 Armadio con batteria ad espansione diretta ad un compressore ed una resistenza (ED)**

***4.2 Precision unit with direct expansion battery, one compressor and one heating element (ED)***

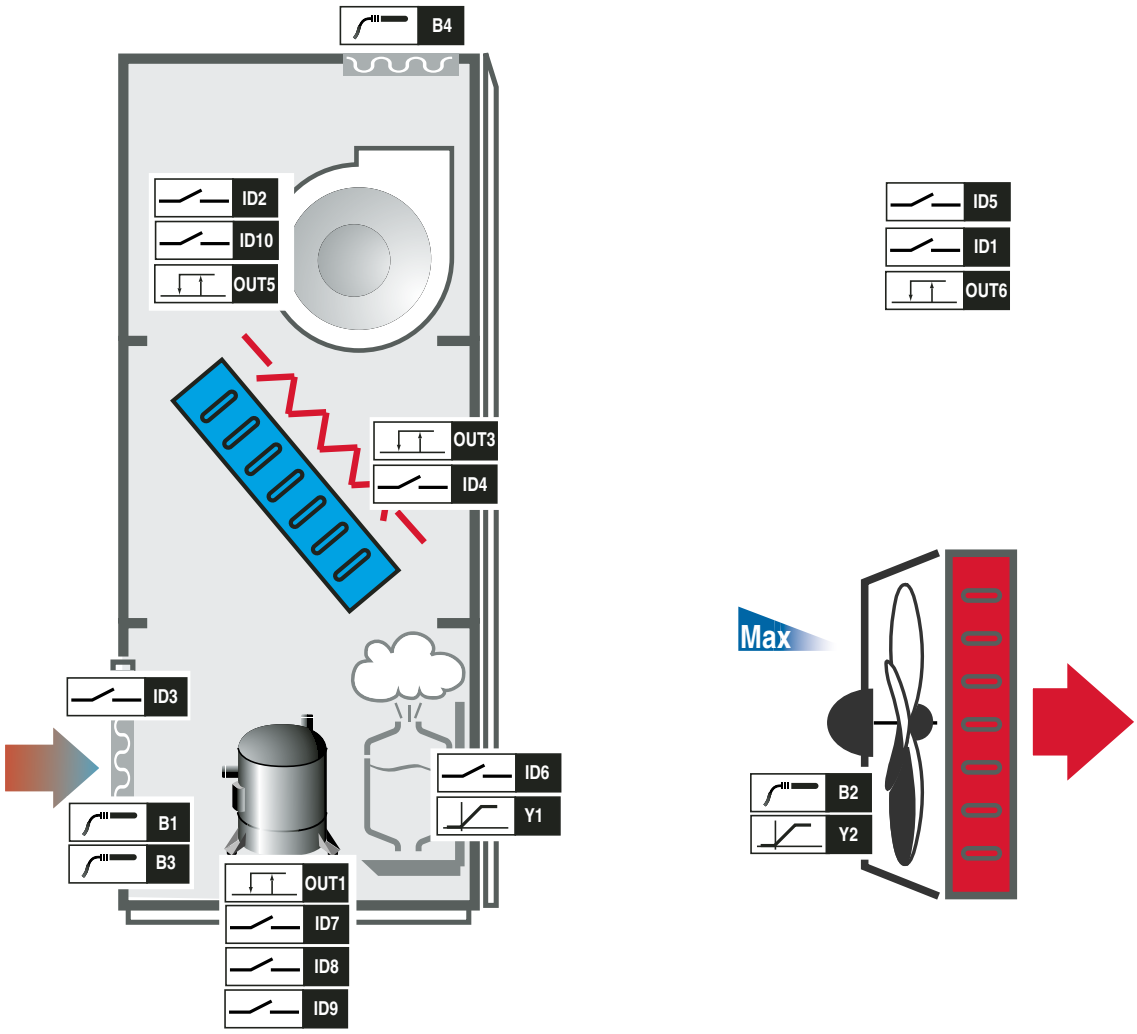



**Fig. 8**

**Schema di collegamento**

***Connection diagram***

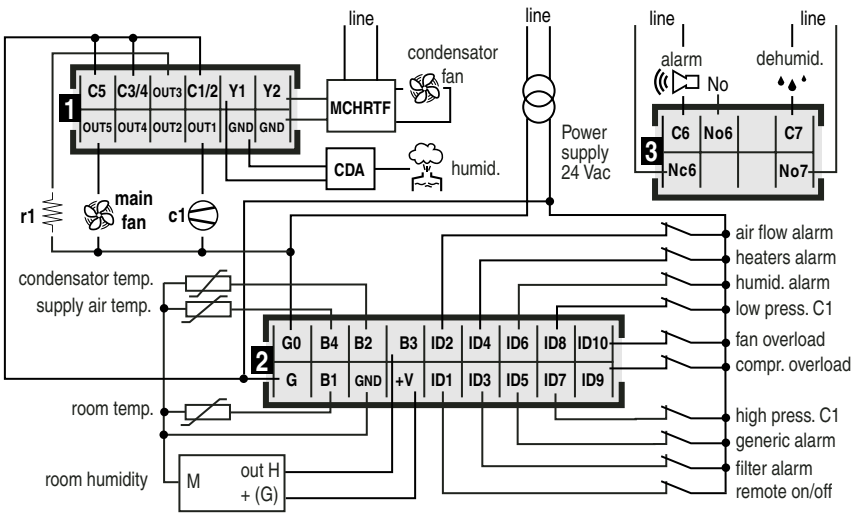



**Fig. 9**

## 4.3 Armadi per shelter

## *4.3 Precision units for shelters*

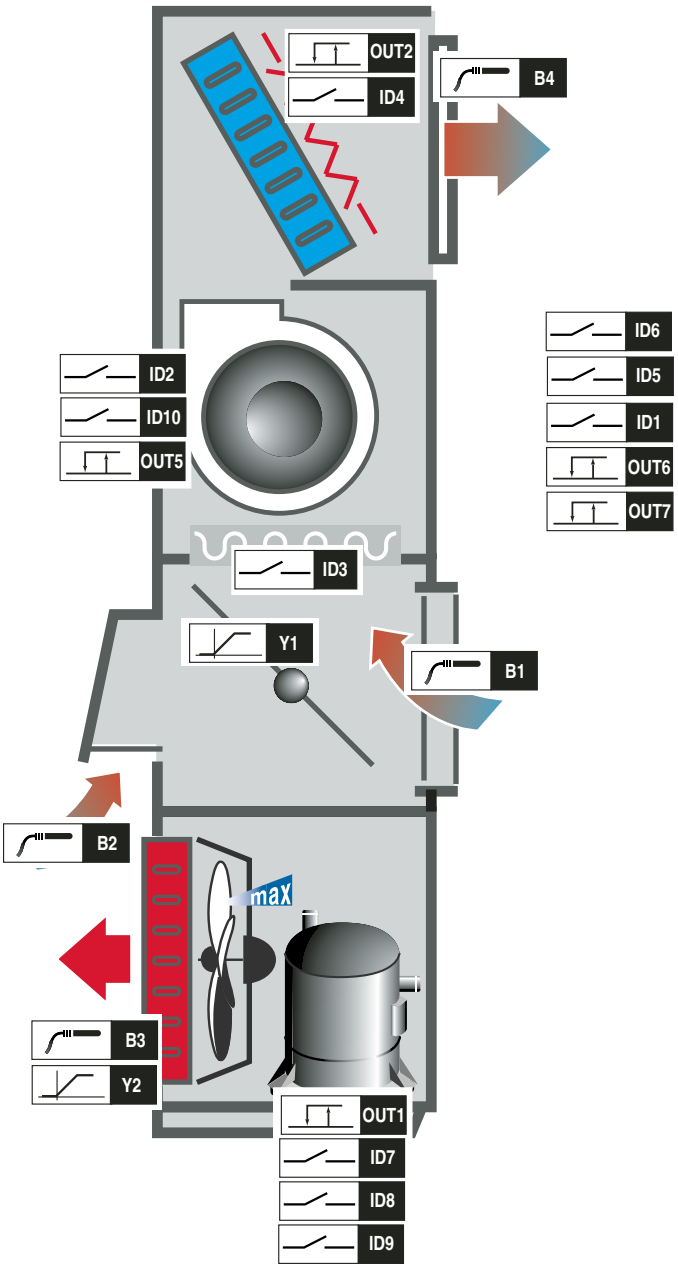



**Fig. 10**

## Schema di collegamento

## *Connection diagram*

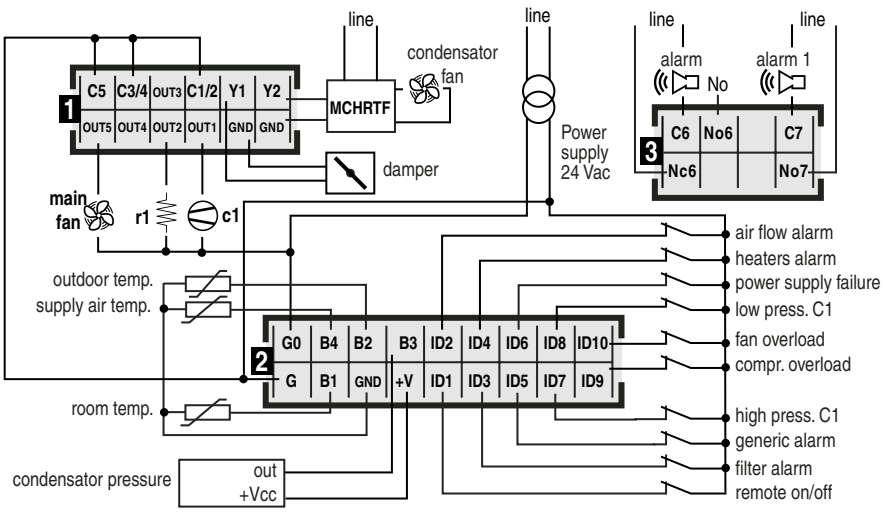



**Fig. 11**

## 4.4 Connessione di più unità

Questa configurazione è possibile sia per macchine ad espansione diretta (ED) che a batteria (CW) che di tipo Shelter.
Essa permette di far ruotare a tempo una unità definita in stand-by su un gruppo massimo di 6 unità.
Se una delle macchine in funzione va in allarme l'unita in stand-by si attiva. Tutto questo è realizzato utilizzando un ingresso ed un uscita digitale che tramite il "master" (unità 1) invia il comando per attivare e disattivare l'unità in stand-by (ogni 10 minuti il comando è aggiornato).

## *4.4 Connecting a series of units*

*This configuration is possible both for direct expansion (ED) and battery (CW) machines, as well as Shelter models.*
*This allows the timed rotation of a unit in stand-by within a group of maximum 6 units.*
*If one of the machines in operation goes into an alarm condition, the unit in stand-by is activated. This is done using a digital input and output which, via the "master" (unit 1), sends the command to activate and deactivate the unit in stand-by (the command is updated every 10 minutes).*

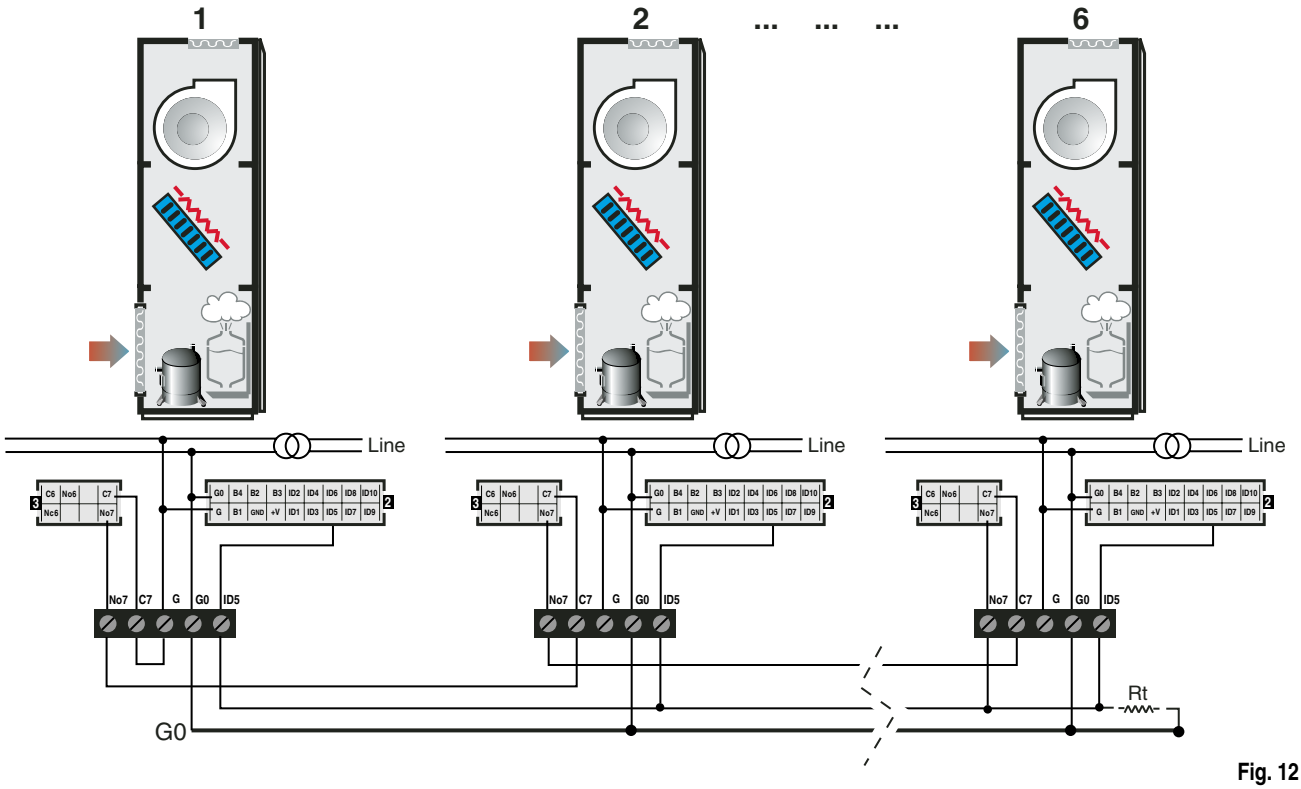



**Fig. 12**

Il disegno mostra come tutti i quadri possano essere uguali e solo in fase di installazione si dovrà eseguire il collegamento, come in figura 12, con un cavo tripolare fra un armadio e l'altro.
Nella fase di installazione si deve fare attenzione ai seguenti tre punti:

1. bisogna impostare un'unica macchina come master;
2. è consigliabile terminare la linea con una resistenza (Rt) di 220 Ω 5 W o di 470 Ω 4 W (cod. CAREL 5729656AXX);
3. assicurarsi che i G0 dei trasformatori non siano posti a terra, per non avere indesiderate correnti nel G0 stesso.

Per il funzionamento bisogna impostare i parametri H2, H3, H4, HA (vedi tabella parametri e successive descrizioni degli stessi).

*The diagram shows how all the electrical panels can be the same, and only during installation does connection have to be made, as in Figure 12, using a three-pole cable between one precision unit and the next.*
*During installation the following three points must be kept in mind:*

1. *one (and only one) machine must be set as master;*
2. *it is recommended to terminate the line with a resistor (Rt), value 220Ω 5W or 470Ω 4W (CAREL code 5729656AXX);*
3. *check that G0 on the transformers is not earthed, to avoid unwanted current at G0.*

*For operation, parameters H2, H3, H4, HA must be set (see following parameter table and description).*

## 5. Parametri di programmazione e loro modifica

### 5.1 Parametri

I parametri sono distribuiti su 3 livelli, ognuno dei quali contiene il precedente, ai quali l'utente può accedere per personalizzare il funzionamento del µAC.

**N.B. Il passaggio diretto da un livello all'altro non è possibile; è necessario terminare la fase di programmazione in corso e, quindi, accedere al livello desiderato (vedi parametro HL, riportato nella tabella 2).**

| Livello | Accesso |
|---|---|
| DIRECT (D): | accesso immediato |
| USER (U): | accesso con password **22** (parametro HH) |
| FACTORY (F): | accesso con password di fabbrica **177** |

### 5.2 Modifica parametri

**Modalità di accesso parametri Direct (D)**

Verrà visualizzato il valore del primo parametro accessibile e in alto a destra, il codice del parametro, lampeggiante.

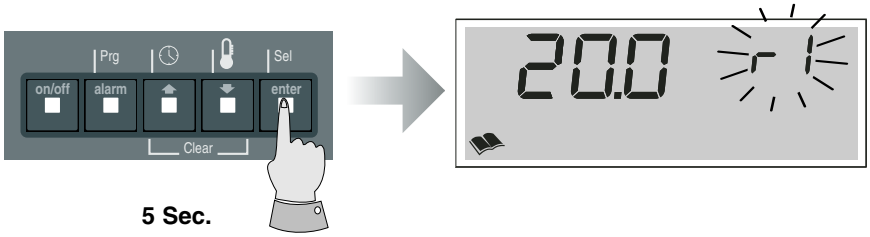



**Fig. 13**

**Modalità di accesso parametri User (U)**

Verrà visualizzato 0 e, a sinistra il simbolo 🔒, lucchetto, a conferma dell'entrata nella procedura con password.

- Con i tasti ↑ e ↓ si imposta la password **22** (default), confermandola, poi, con il tasto enter.
  Apparirà, quindi, il valore del primo parametro accessibile e in alto a destra, il codice del parametro, lampeggiante.

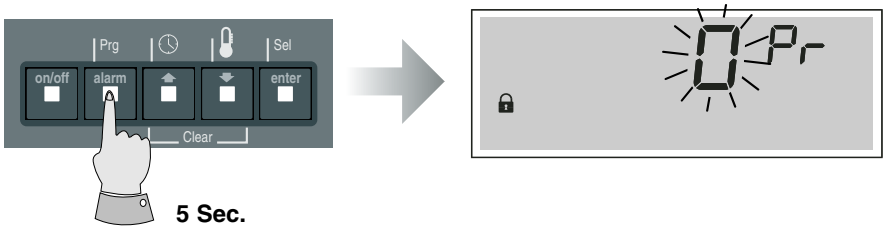



**Fig. 14**

**Modalità di accesso parametri Factory (F)**

Verrà visualizzato 0 e, a sinistra il simbolo 🔒, lucchetto, a conferma dell'entrata nella procedura con password.

- Con i tasti ↑ e ↓ si imposta la password **177**, confermandola, poi, con il tasto enter.

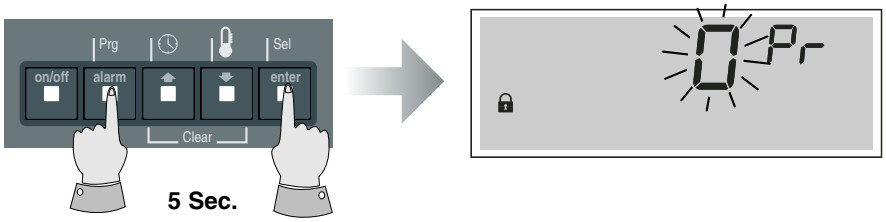



**Fig. 15**

## *5. Programming parameters and their modification*

### *5.1 Parameters*

*The parameters are divided into 3 levels, each of which contains the previous, which the user can access to customise the operation of the µAC.*

***N.B. It is not possible to move directly from one level to another; the current programming phase must be terminated before accessing the desired level (see parameter HL, described in table 2).***

| *Level* | *Access* |
|---|---|
| *DIRECT (D):* | *immediate access* |
| *USER (U):* | *access via password 22 (parameter HH)* |
| *FACTORY (F):* | *access via factory password 177* |

### *5.2 Parameter modification*

***Accessing Direct parameters (D)***

*The value of the first accessible parameter is displayed in the upper right, with the parameter code flashing.*

***Accessing User parameters (U)***

*The number 0 is displayed and, on the left the lock symbol 🔒, confirming access via password to the procedure.*

- *The ↑ and ↓ buttons are used to enter the password **22** (default), which is confirmed by pressing the enter button.*
  *The value of the first accessible parameter is then displayed in the upper right, with the parameter code flashing.*

***Accessing Factory parameters (F)***

*The number 0 is displayed and, on the left the lock symbol 🔒, confirming access via password to the procedure.*

- *The ↑ and ↓ buttons are used to enter the password **177**, which is confirmed by pressing the enter button.*

Apparirà, quindi, il valore del primo parametro accessibile e, in alto a destra, il codice del parametro, lampeggiante.

Con i tasti [▲] e [▼] è possibile scorrere i vari parametri.

*The value of the first accessible parameter is then displayed in the upper right, with the parameter code flashing.*

*The [▲] and [▼] buttons can be used to scroll the various parameters.*

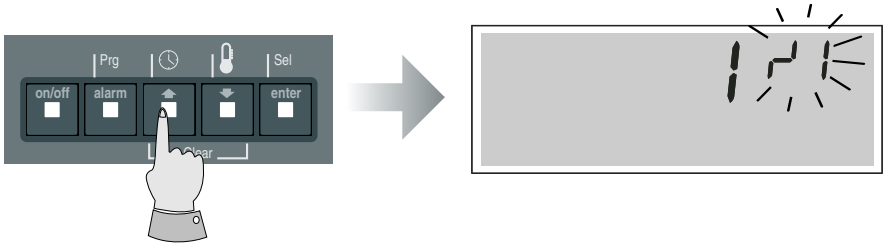



**Fig. 16**

Entrati in un qualsiasi livello di parametri, una pressione del tasto [enter] visualizza il valore, lampeggiante, del parametro selezionato, mentre con i tasti [▲] e [▼] è possibile variarlo.

*Once having entered any level of parameters, one pressing of the [enter] button displays the value, flashing, of the parameter selected, while the [▲] and [▼] buttons can be used to modify such value.*

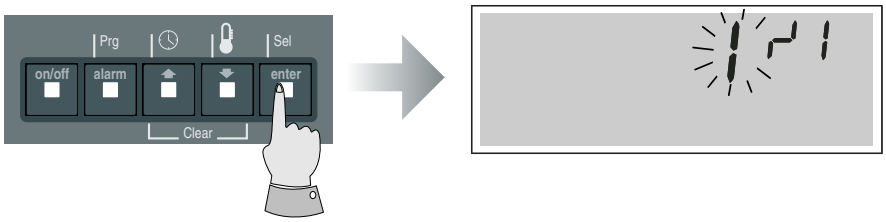



**Fig. 17**

Premere nuovamente [enter] per fermare temporaneamente il nuovo valore.

Quindi, con i tasti [▲] e [▼] si scorre il menù dei parametri, ripetendo le operazioni precedenti per ogni parametro da modificare.

Premere il tasto [alarm], invece, per registrare le modifiche effettuate e uscire dalla programmazione.
Durante tutte le fasi di impostazione dei parametri rimane visualizzato, in basso a sinistra sul display, il simbolo 📖, un libro aperto; invece, durante la fase di impostazione della password, compare anche un lucchetto 🔒, a confermare la presenza di un "blocco".

La presenza dei parametri nelle varie famiglie è condizionata dal valore di alcuni di essi:
1. presenza sonda aria esterna;
2. presenza sonda umidità;
3. presenza sonda aria mandata.

*Press [enter] again to temporarily store the new value.*

*Then, using the [▲] and [▼] buttons, scroll the parameters menu, repeating the previous steps for each parameter to be modified.*

*Press the [alarm] button, on the other hand, to store the modifications made and exit programming.*
*During all phases of setting the parameters the open book symbol 📖 is displayed in the lower left of the display; on the other hand, when setting the password, a lock 🔒 also appears, confirming the presence of a "block".*

*The presence of the parameters in the various families depends on the value of some of these:*
*1. presence of external air probe;*
*2. presence of humidity probe;*
*3. presence of supply air probe.*

**Impostazione dei parametri di default**

La pressione tasto [alarm] all'accensione memorizza nella Eeprom i parametri di default. Durante l'operazione viene visualizzata la scritta **dF.**

***Setting the default parameters***

*Pressing the [alarm] button on start up saves the default parameters in the EEPROM. During this operation the message **dF** is displayed.*

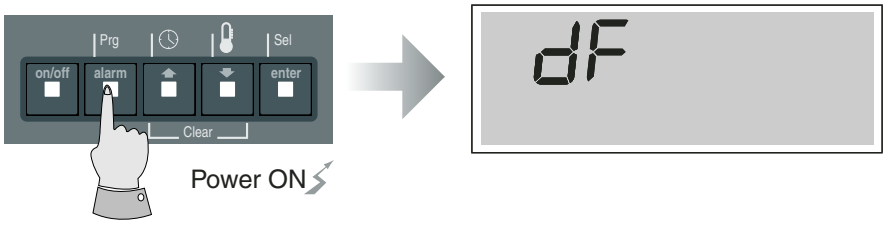



**Fig. 18**

**Copia dei dati da chiave a eeprom macchina**
Con il µAC disalimentato, inserire la chiave (a codice MAC2KEY000) nell'apposito connettore, (vedi fig. 5).

Dando tensione alla macchina tenendo premuto il tasto [↑] si programmano i parametri de lla macchina con i dati contenuti nella chiave di programmazione.
Durante l'operazione viene visualizzata la scritta **CE** e, in caso di errore, **CEEE**.

***Copying data from the key to the machine's EEPROM***
*With the power disconnected from the µAC, insert the key (code MAC2KEY000) in the relative connector, (see Fig. 5).*

*Powering the machine while keeping the [↑] button pressed programs the machine's parameters with the values of the data contained in the programming key.*
*During this operation the message **CE** is displayed, and, in the case of errors, **CEEE**.*

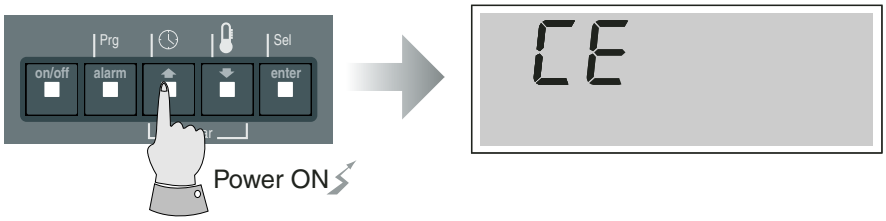



**Fig. 19**

**Copia dei dati da eeprom della macchina a chiave**

La pressione contemporanea dei tasti [alarm] e [↓] all'accensione, consente di programmare la chiave con i parametri della macchina.
Durante l'operazione viene visualizzata la scritta **EC** e, in caso di errore appare **ECEE**.

***Copying data from the machine's EEPROM to the key***

*Pressing the [alarm] and [↓] button together on start up allows the key to be programmed with the machine's parameters.*
*During this operation the message **EC** is displayed, and, in the case of errors, **ECEE**.*

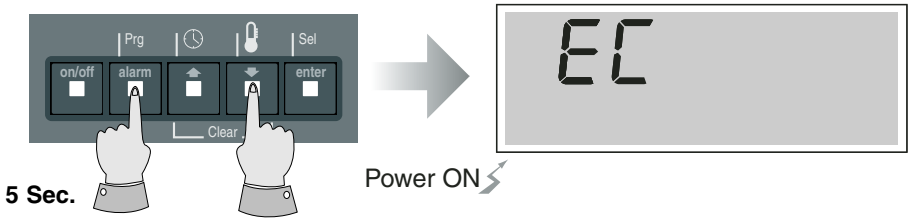



**Fig. 20**

**Regolazione contrasto LCD**
È possibile regolare il contrasto del display in funzione dell'angolo visivo di effettivo utilizzo.

Premendo contemporaneamente i tasti [enter] e [↑] si incrementa il valore, viceversa, con [enter] e [↓] lo si diminuisce.

***Adjusting LCD contrast***
*The contrast of the display can be adjusted to suit the effective angle of viewing.*

*Pressing the [enter] and [↑] button at the same time increases the value, vice-versa, [alarm] and [↓] decreases it.*

## Avvertenza importante

**dopo aver modificato parametri che alterano la configurazione della macchina (numero compressori, presenza valvola, ecc.) variano, di conseguenza, il ritardo degli allarmi oppure le tempistiche dei compressori; al fine di ottenere immediatamente il corretto funzionamento, si consiglia di resettare il regolatore interrompendo l'alimentazione.**
**Inoltre tali selezioni devono essere eseguite con gli attuatori scollegati per evitare una loro accensione non desiderata.**

## *Important warning*

***After having modified any parameters which alter the machine's configuration (number of compressors, presence of valve, etc.), the alarm delays or compressor times may vary as a consequence; in order to have correct operation immediately, it is recommended to reset the regulator by disconnecting the power supply.***
***In addition, such selections must be made with the actuators disconnected, so as to avoid unwanted activation of the latter.***

## 6. Descrizione e configurazione dei parametri

## 6. Description and configuration of the parameters

| / / | Sonde / *Probes* | HL= | Tipo/Type 0 | 1 | 2 | 3 | Min *Min* | Max *Max* | U.M. *U. o. M.* | Var. *Var.* | Def *Def* | Pres. *Pres.* | Nuovo *New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Presenza sonda aria esterna B2/*Presence external air probe B2*<br>0= assente/*absent*<br>1= NTC CAREL/*TC CAREL* | | F | F | U | U | 0 | 1 | flag | 1 | 0 | | |
| 2 | Tipo di sonda umidità/press./temp. B3/*Type of humidity/press./temp. probe B3*<br>0= assente / *absent*<br>1= 0-1Vdc o 0-20mA / *0-1Vdc or 0-20mA*<br>2= 4-20 mA / *4-20mA* | | F | F | F | F | 0 | 2 | flags | 1 | 0 | | |
| 3 | Presenza aria mandata B4 / *Presence supply air B4*<br>0= assente / *absent*<br>1= NTC CAREL (abilita allarme relativo) / *NTC CAREL (enable corresp. alarm)* | | F | F | F | F | 0 | 1 | flag | 1 | 0 | | |
| 4 | Valore umidità/pressione a 0 mA, 4mA o 0Vdc<br>*Value of humidity/pressure at 0mA, 4mA or 0Vdc* | | F | F | F | F | 0 | /5 | %rH<br>bar | 0.1 | 0 | /2≠0 | |
| 5 | Valore umidità/pressione a 20mA o 1Vdc<br>*Value of humidity/pressure at 20mA or 1Vdc* | | F | F | F | F | /4 | 100 | %rH<br>bar | 0.1 | 100 | /2≠0 | |
| 6 | Calibrazione sonda B1<br>*Calibration probe B1* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | | |
| 7 | Calibrazione sonda B2<br>*Calibration probe B2* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | /1≠0 | |
| 8 | Calibrazione sonda B3 / *Calibration probe B3* | | U | F | U | U | -10.0 | 10.0 | %rH/bar | 0.1 | 0.0 | /2≠0 | |
| 9 | Calibrazione sonda B4<br>*Calibration probe B4* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | /3≠0 | |
| A | Filtro digitale / *Digital filter* | | U | F | U | U | 1 | 15 | - | 1 | 4 | | |
| b | Limitazione ingresso / *Input limit* | | U | F | U | U | 1 | 15 | - | 1 | 8 | | |
| c | Unità di misura (0=°C,1=°F) / *Unit of measure (0=°C,1=°F)* | | U | U | U | U | 0 | 1 | flag | 1 | 0 | | |

| r r | Regolatore / *Probes* | HL= | Tipo/Type 0 | 1 | 2 | 3 | Min *Min* | Max *Max* | U.M. *U. o. M.* | Var. *Var.* | Def *Def* | Pres. *Pres.* | Nuovo *New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Set Point temperatura (estate) / *Temperature Set Point (cooling)* | | D | D | D | D | rA | rb | °C/°F | 0.1 | 20.0 | | |
| 2 | Differenziale raffreddamento<br>*Cooling differential* | | D | D | D | D | 0.1<br>0.1 | 11.0<br>19.8 | °C<br>°F | 0.1 | 3.0 | | |
| 3 | Differenziale riscaldamento<br>*Heating differential* | | D | D | D | D | 0.1<br>0.1 | 11.0<br>19.8 | °C<br>°F | 0.1 | 2.0 | | |
| 4 | Zona neutra per la temperatura<br>*Temperature dead zone* | | D | D | D | D | 0.1<br>0.1 | 20.0<br>36.0 | °C<br>°F | 0.1 | 1.0 | | |
| 5 | Set Point umidità / *Humidity Set Point* | | D | D | D | D | rc | rd | %rH | 1 | 50 | /2≠0 | |
| 6 | Differenziale umidificazione / *Humidification differential* | | D | D | D | D | 1 | 20 | %rH | 1 | 4 | /2≠0 | |
| 7 | Differenziale deumidificazione / *Dehumidification differential* | | D | D | D | D | 1 | 20 | %rH | 1 | 3 | /2≠0 | |
| 8 | Zona neutra per l'umidità / *Humidity dead zone* | | D | D | D | D | 0 | 20 | %rH | 1 | 2 | /2≠0 | |
| 9 | Set Point temperatura (inverno) / *Temperature Set Point (heating)* | | D | D | D | D | rA | rb | °C/°F | 0.1 | 18.0 | | |
| A | Set minimo temperatura (anche per compensazione)<br>*Minimum temperature set point (also for compensation)* | | U | F | U | U | -20<br>-4 | rb | °C<br>°F | 0.1 | 0 | | |
| b | Set massimo temperatura (anche per compensazione)<br>*Maximum temperature set point (also for compensation)* | | U | F | U | U | rA | 60<br>140 | °C<br>°F | 0.1 | 50 | | |
| c | Set minimo umidità / *Minimum humidity set point* | | U | F | U | U | 0 | rd | %rH | 1 | 0 | /2≠0 | |
| d | Set massimo umidità / *Maximum humidity set point* | | U | F | U | U | rc | 100 | %rH | 1 | 100 | /2≠0 | |
| E | Tipo di regolazione temperatura / *Type of temperature regulation*<br>0= P, 1= P+I | | U | F | U | U | 0 | 1 | flag | 1 | 0 | | |
| F | Tempo integrazione per azione PI / *Integration time for PI action* | | U | F | U | U | 10 | 3600 | s | 1 | 600 | rE≠0 | |
| G | Autorità (unica per Estate/inverno) vale per la compensazione<br>*Authority (unique for Cooling/heating) for compensation* | | U | F | U | U | -2.0 | 2.0 | | 0.1 | 0.5 | /1≠0 | |
| H | Set Point di compensazione sulla temp. letta da B2 (estate)<br>*Set Point compensation on temp. read by B2 (cooling)* | | U | F | U | U | -20<br>-4 | 60<br>140 | °C<br>°F | 0.1 | 25.0 | /1≠0 | |
| i | Set Point di compensazione sulla temp. letta da B2 (inverno)<br>*Set Point compensation on temp. read by B2 (heating)* | | U | F | U | U | -20<br>-4 | 60<br>140 | °C<br>°F | 0.1 | 10.0 | /1≠0 | |
| L | Differenziale free cooling<br>*Free cooling differential* | | U | F | U | U | 0<br>0 | 30<br>54 | °C<br>°F | 1 | 9 | /1≠0 | |
| n | Limite inferiore temperatura mandata<br>*Supply temperature lower limit* | | U | F | U | U | -20<br>-4 | 30<br>86 | °C<br>°F | 1 | 5 | /1≠0 | |
| o | Lettura sonda B2 / *Reading from probe B2* | | D | D | D | D | | | °C/°F | | | /1≠0 | |
| P | Lettura sonda B3 / *Reading from probe B3* | | D | D | D | D | | | %rH/bar | | | /2≠0 | |
| r | Lettura sonda B4 / *Reading from probe B4* | | D | D | D | D | | | °C/°F | | | /3≠0 | |
| t | Impostazione fasce orarie / *Time band setting*<br>0= disabilitate / *disabled*<br>1= vent. al min. con monitoriz. della temp./*fan on min. with temp. monitoring*<br>2= On/off / *ON/OFF* | | U | U | D | D | 0 | 2 | flags | 1 | 0 | | |

| c<br>c | Compressore<br>*Compressor* | HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Tempo minimo di On / *Minimum ON time* | | U | F | F | F | 0 | 300 | s | 1 | 60 | | |
| 2 | Tempo minimo di Off / *Minimum OFF time* | | U | F | F | F | 0 | 900 | s | 1 | 60 | | |
| 3 | Tempo tra 2 accensioni / *Time between 2 start-ups* | | U | F | F | F | 0 | 900 | s | 1 | 360 | | |
| 4 | Ritardo accensione tra i 2 compressori<br>*ON delay between the 2 compressors* | | U | F | F | F | 0 | 300 | s | 1 | 30 | | |
| 5 | Ritardo spegnimento tra i 2 compressori<br>*OFF delay between the 2 compressors* | | U | F | F | F | 0 | 300 | s | 1 | 0 | | |
| 6 | Rotazione compressori / *Compressor rotation*<br>0= disabilitata / *disabled*<br>1= abilitata / *enabled* | | F | F | F | F | 0 | 1 | flag | 1 | 0 | | |
| 7 | Ritardo accensione comp. dalla partenza ventilatore mandata<br>*Delay comp. ON from supply fan start-up* | | U | F | U | F | 0 | 300 | s | 1 | 20 | | |
| 8 | Soglia contaore per il compressore<br>*Hour counter threshold for the compressor*<br>0= disabilitato / *disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| 9 | Contaore compressore 1 / *Hour counter compressor 1* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |
| A | Contaore compressore 2 / *Hour counter compressor 2* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |

| F<br>F | Ventilatori<br>*Fans* | HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Modalità funzionamento ventola / *Fan operating mode*<br>0= sempre On /*always ON*<br>1= regolazione velocità in proporzionale. Se utilizzato in condensazione mantiene il ventilatore al minimo anche sotto il valore espresso da F5<br>*1= proportional speed regulation. If used in condensation the fan is kept at minimum even below the value of F5*<br>2= regolazione velocità in proporzionale. Se utilizzato in condensazione spegne il ventilatore sotto il valore espresso da F5 con un isteresi pari a 0.5 bar se in pressione o di 1 °C se in temperatura<br>2= *proportional speed regulation. If used in condensation the fan is switched off below the value of F5, with an hysteresis of 0.5 bar for pressure or 1°C for temperature* | | F | F | F | F | 0 | 2 | flags | 1 | 1 | | |
| 2 | Soglia tensione minima per Triac / *Minimum Triac voltage threshold* | | F | F | F | F | 0 | F4 | step | 1 | 35 | | |
| 3 | Soglia tensione massima per Triac / *Maximum Triac voltage threshold* | | F | F | F | F | F3 | 100 | step | 1 | 75 | | |
| 4 | Durata impulso triac / *Triac pulse width* | | F | F | F | F | 0 | 15 | ms | 1 | 2 | | |
| 5 | % banda regolazione per minima velocità o temperatura/pressione minima velocità in condensazione<br>*% regulation band for minimum speed or temperature/pressure for minimum speed in condensation* | | U | F | U | F | 0<br>0<br>/4 | F6 | %<br>°C/°F<br>bar | 0.1 | 20 | | |
| 6 | % banda regolazione per massima velocità o temperatura/pressione massima velocità in condensazione<br>*% regulation band for maximum speed or temperature/pressure for maximum speed in condensation* | | U | F | U | F | F5 | 100<br>158<br>/5 | %<br>°C/°F<br>bar | 0.1 | 100 | | |
| 7 | Valore di minima uscita / *Minimum output value* | | U | F | U | F | 0 | F8 | % | 1 | 10 | | |
| 8 | Valore di massima uscita / *Maximum output value* | | U | F | U | F | F7 | 100 | % | 1 | 100 | | |
| 9 | Soglia contaore per il ventilatore / *Fan hour counter threshold*<br>0= disabilitato/*disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| A | Contaore ventilatore mandata / *Supply fan hour counter* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |
| b | Soglia contaore per il filtro / *Filter hour counter threshold*<br>0= disabilitato/*disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| c | Contaore filtro / *Filter hour counter* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |
| d | Ritardo spegnimento ventilatore mandata / *Supply fan OFF delay* | | U | F | U | F | 0 | 900 | s | 1 | 20 | | |
| E | Tempo di spunto ventole in condensazione<br>*Fan pick-up time in condensation* | | U | F | F | F | 0 | 60 | s | 1 | 4 | | |

| P<br>P | Allarme<br>*Alarm* HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Ritardo allarme di flusso dalla partenza ventilatore<br>*Flow alarm delay from fan start-up* | U | F | F | F | 0 | 250 | s | 10 | 20 | | |
| 2 | Ritardo allarme di flusso durante il funzionamento<br>*Flow alarm delay during operation* | U | F | F | F | 0 | 90 | s | 1 | 5 | | |
| 3 | Ritardo allarme bassa pressione dalla partenza compressore<br>*Low pressure alarm delay from compressor ON* | U | F | F | F | 0 | 250 | s | 1 | 40 | | |
| 4 | Attivazione del buzzer / *Buzzer activation*<br>0= OFF, 1-14= min. 15= continuo/*continuous* | U | U | U | U | 0 | 15 | min | 1 | 0 | | |
| 5 | Reset allarmi (varie configurazioni)/*Reset alarms (various configurations)* | F | F | F | F | 1 | 5 | flag | 1 | 1 | | |
| 6 | Delta dal set effettivo per allarme bassa temperatura<br>*Delta from effective set point for low temperature alarm* | U | F | U | U | 0 | 50<br>90 | °C<br>°F | 1 | 10 | | |
| 7 | Delta dal set effettivo per allarme alta temperatura<br>*Delta from effective set point for high temperature alarm* | U | F | U | U | 0 | 50<br>90 | °C<br>°F | 1 | 10 | | |
| 8 | Delta dal set per allarme bassa umidità<br>*Delta from set point for low humidity alarm* | U | F | U | U | 0 | 50 | %rH | 1 | 20 | /2≠0 | |
| 9 | Delta dal set per allarme alta umidità<br>*Delta from set point for high humidity alarm* | U | F | U | U | 0 | 50 | %rH | 1 | 20 | /2≠0 | |
| A | Ritardo allarme alta/bassa temperatura/umidità all'accensione<br>*Alarm delay high/low temperature/humidity on start-up* | U | U | U | U | 0 | 150 | min | 1 | 20 | | |
| b | Tipo gestione ingresso allarme generico ID5<br>*Type of management of generic alarm input ID5*<br>0= nessun allarme collegato / *no alarm connected*<br>1= allarme di sola segnalazione - reset automatico<br>*1= signal only alarm - automatic reset*<br>2= allarme di sola segnalazione - reset manuale<br>*2= signal only alarm - manual reset*<br>3= allarme grave - reset automatico /*serious alarm - automatic reset*<br>4= allarme grave - reset manuale / *serious alarm - manual reset*<br>5= allarme grave - reset automatico attivo anche in stand-by<br>*5= serious alarm - automatic reset also active in stand-by*<br>6= allarme grave - reset manuale attivo anche in stand-by<br>*6= serious alarm - manual reset also active in stand-by* | U | F | U | F | 0 | 6 | flag | 1 | 1 | | |
| c | Ritardo allarme generico / *Generic alarm delay* | U | U | U | F | 0 | 250 | s | 1 | 60 | Pb≠0 | |
| d | Differenza temp. ritorno-mandata per allarme temp. mandata<br>*Return-supply temp. difference for supply temp. alarm* | U | F | F | F | 0 | 20<br>36 | °C<br>°F | 0.1 | 3 | /3≠0 | |
| E | Selezione ingresso ID4 / *Input ID4 selection* | U | F | U | F | 0 | 1 | flag | 1 | 0 | | |
| F | Selezione ingresso ID9 / *Input ID9 selection* | U | F | F | F | 0 | 1 | flag | 1 | 0 | | |
| G | Abilitazione preallarme di alta temp. / *High temper. prealarm enabling* | U | F | U | U | 0 | 1 | flag | 1 | 0 | | |

| H<br>H | Generali<br>*General* HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Modello di macchina / *Machine model*<br>0= unita' ED / *ED unit*<br>1= unità CW / *CW unit*<br>2= unità CW (E/I) / *CW unit (H/C)*<br>3= shelter / *shelter* | F | F | F | F | 0 | 3 | flags | 1 | 0 | | |
| 2 | N. di macchine in rotazione / *No. of machines in rotation*<br>0= macchina stand-alone / *stand-alone machine*<br>2= 2 unità/*units*.....6= 6 unità/*units* | U | U | U | U | 0 | 6 | flags | 1 | 0 | | |
| 3 | Indirizzo per unità in rotazione / *Address of unit in rotation* | U | U | U | U | 1 | 6 | - | 1 | 1 | H2≠0 | |
| 4 | Tempo di rotazione tra più unità / *Rotation time between a series of units*<br>0= modalità test t=2 min. / *0= test mode t=2 min.* | U | U | U | U | 0 | 250 | h | 1 | 0 | H2≠0 | |
| 5 | Modalità di funzionamento delle 2 uscite "freddo" Out1/Out2<br>*Operating mode of the 2 "cool" outputs*<br>1= 1 compressore / *1 compressor*<br>2= 2 compressori su 2 circuiti / *compressors on 2 circuits*<br>3= valvola a tre punti / *three-point valve*<br>4= 2 compressori in parallelo binario / *2 compressors in binary parallel*<br>5= 2 compr. in tandem (50+50%) / *2 compr.s in tandem (50+50%)* | F | F | F | F | 1 | 5 | flags | 1 | 1 | | |
| 6 | Modalità di funzionamento delle 2 uscite "caldo" Out3/Out4<br>*Operating mode of the 2 "heat" outputs*<br>0= nessun elemento riscaldante / *no heating element*<br>1= 1 resistenza / *1 heating element*<br>2= 2 resistenze / *2 heating elements*<br>3= valvola a tre punti / *three-point valve*<br>4= 2 resistenze in binario / *2 heating elements in binary* | F | F | F | F | 0 | 4 | flags | 1 | 1 | | |

| H<br>H | Generali<br>*General* HL= | Tipo/Type<br>0 | <br>1 | <br>2 | <br>3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Tempo di escursione valvola 3P o serranda<br>*3P valve or damper excursion time* | F | F | F | F | 0 | 600 | s | 1 | 150 | | |
| 8 | Presenza umidificatore / *Presence of humidifier* | F | F | F | F | 0 | 1 | flag | 1 | 0 | /2≠0 | |
| 9 | Tipo di deumidificazione / *Type of dehumidification*<br>0= accensione comp. 1 / *comp. 1 ON*<br>1= accensione comp. 2 / *comp. 2 ON*<br>2= accensione due comp. / *two comp. ON*<br>3= parzializzazione rampa fredda / *capacity-controlled cooling ramp*<br>4= riduzione velocità vent. / *fan speed reduction*<br>5= azione 4+0 / *action 4+0*<br>6= azione 4+1 / *action 4+1*<br>7= azione 4+2 / *action 4+2*<br>8= azione 4+3 / *action 4+3*<br>9= nessuna azione / *no action* | F | F | F | F | 0 | 9 | flags | 1 | 0 | /2≠0 | |
| A | Funzione del relè di deumidificazione/umidificazione<br>*Function of the dehumidification/humidification relay*<br>0= eccitato in deumidificazione / *energised in dehumidification*<br>1= diseccitato in deumidificazione / *de-energised in dehumidification*<br>2= relè per allarmi non gravi (segue logica parametro HF)<br>2= *relay for non-serious alarms (follows logic of parameter HF)*<br>3= uscita per controllo rotazione / *output for rotation control*<br>4= eccitato in umidificazione / *energised in humidification*<br>5= diseccitato in umidificazione / *de-energised in humidification*<br>6= selezione a 2 vent., acceso in deum. / *2 fan selection on during deum.*<br>7= selezione a 2 vent., spento in deum. / *2 fan selection off during deum.* | F | F | F | F | 0 | 7 | flags | 1 | 0 | | |
| b | Funzione uscita Y2 (taglio di fase) / *Function of output Y2 (phase-cut)*<br>0= controllo velocità ventilatore mandata / *supply fan speed control*<br>1= controllo velocità ventilatore condensazione tramite B3<br>*1= condensation fan speed control using B3*<br>2= controllo velocità ventilatore condensazione tramite B2<br>*2= condensation fan speed control using B2* | F | F | F | F | 0 | 2 | flags | 1 | 0 | | |
| c | Funzione della sonda B2 / *Function of probe B2*<br>0= compensazione / *compensation*<br>1= free-cooling tramite 0-10V / *free-cooling using 0-10V*<br>2= free-cooling tramite Out3-Out4 / *free-cooling using Out3-Out4*<br>3= free-cooling On/Off con Out3 / *free-cooling ON/OFF with Out3*<br>4= controllo condensazione / *condensation control* | F | F | F | F | 0 | 3 | flag | 1 | 0 | /1≠0 | |
| d | Funzione della sonda B3 / *Function of probe B3*<br>0= controllo umidità / *humidity control*<br>1= controllo condensazione / *condensation control* | F | F | F | F | 0 | 1 | flag | 1 | 0 | /2≠0 | |
| E | Ingresso digitale ON/OFF / *ON/OFF digital input*<br>0= assente / *absent*<br>1= presente / *present* | U | U | U | U | 0 | 1 | flag | 1 | 0 | | |
| F | Logica del relè di allarme / *Alarm relay logic*<br>0= diseccitato in allarme per tutti gli allarmi<br>*0= de-energised in alarm for all alarms*<br>1= eccitato in allarme per tutti gli allarmi / *energised in alarm for all alarms*<br>2= diseccitato in allarme solo per gli allarmi gravi<br>*2= de-energised in alarm only for serious alarms*<br>3= eccitato in allarme solo per gli allarmi gravi<br>*3= energised in alarm only for serious alarms* | U | U | U | F | 0 | 3 | flags | 1 | 0 | | |
| G | Ritardo all'accensione / *Delay on start-up* | U | U | U | U | 0 | 300 | s | 1 | 0 | | |
| H | Password USER / *USER password* | U | U | U | U | 0 | 200 | - | 1 | 22 | | |
| i | Blocca modifiche parametri (viene visualizzato dal lucchetto)<br>*Block parameter modifications (displayed by lock)*<br>0= no blocco / *no block* | U | U | U | U | 0 | 1 | flag | 1 | 0 | | |
| L | Set di parametri / *Parameter sets* | F | F | F | F | 0 | 3 | flags | 1 | 0 | | |
| n | Selezione visualizzazione sul display / *Select data shown on display*<br>0= sonde B1, B3 (se presente) / *probes B1, B3 (if present)*<br>1= set-point di temp. e umid. (se presente)<br>*1= temperature. and humid. set-point (if present)*<br>2= giorno ed ora (se presente l'orologio)<br>*2= day and time (if clock present)* | U | F | U | F | 0 | 2 | flags | 1 | 0 | | |
| o | Indirizzo seriale rete supervisione / *Supervisor network serial address* | U | U | U | U | 1 | 200 | - | 1 | 1 | | |
| P | Baudrate seriale supervisore / *Supervisor serial baudrate*<br>1= 1200, 2= 2400, 3= 4800, 4= 9600, 5=19200 Baud | U | U | U | U | 1 | 5 | flags | 1 | 5 | | |
| r | Versione software / *Software version* | D | D | D | D | | | | | 1.3 | | |

**Tab. 2**

### 6.1 ⌐ = parametri relativi alle sonde

**⌐ 1 Presenza sonda aria esterna B2.**
Imposta la presenza della sonda NTC B2, la relativa funzione deve essere selezionata tramite il parametro HC.
0= sonda assente
1= sonda NTC CAREL
**Range: 0…1 flag**
**Def.: 0**

**⌐ 2 Tipo sonda B3**
Imposta il tipo di sonda B3 (0-20 mA, 4-20mA, 0-1V).
**N.B. Tale programmazione deve essere accompagnata anche dall'impostazione del ponticello (B3 selection - vedi Fig. 5).**
La relativa funzione deve essere selezionata tramite il parametro Hd.
0= sonda assente
1= 0…1 V o 0…20 mA
2= 4…20 mA
**Range: 0…2 flags**
**Def.: 0**

**⌐ 3 Presenza sonda aria mandata B4**
Imposta la presenza della sonda NTC B4.
0= sonda assente
1= sonda NTC CAREL (abilita anche l'allarme relativo alla funzione raffreddamento, vedi parametro Pd.)
**Range: 0…1 flag**
**Def.: 0**

**⌐ 4 Valore minimo misurato dall'ingresso B3 a 0 mA, 4 mA o 0 Vdc**
Tale parametro consente di configurare il valore minimo della sonda B3.
**Range: 0…/5 %rH, bar**
**Def.: 0**

**⌐ 5 Valore massimo misurato dall'ingresso B3 a 20 mA o 1 Vdc**
Tale parametro consente di configurare il valore max della sonda B3.
**Range: /4…100 %rH, bar**
**Def.: 100**

**⌐ 6 Calibrazione ingresso B1**
Consente di correggere il valore misurato da B1.
**Range: -6,0…6,0 °C -10,8…10,8 °F**
**Def.: 0,0**

**⌐ 7 Calibrazione ingresso B2**
Consente di correggere il valore misurato da B2.
**Range: -6,0…6,0 °C -10,8…10,8 °F**
**Def.: 0,0**

**⌐ 8 Calibrazione ingresso B3**
Consente di correggere il valore misurato da B3.
**Range: -10,0…10,0 %rH, bar**
**Def.: 0,0**

**⌐ 9 Calibrazione ingresso B4**
Consente di correggere il valore misurato da B4.
**Range: -6,0…6,0 °C -10,8…10,8 °F**
**Def.: 0,0**

**⌐ A Filtro digitale**
Consente di stabilire il coefficiente usato nel filtraggio digitale del valore misurato.
Valori elevati di questo parametro consentono di eliminare eventuali disturbi transitori agli ingressi analogici (ma diminuiscono la prontezza di misura). Il valore consigliato è 4.
**Range: 1…15**
**Def.: 4**

### *6.1 ⌐ = probe parameters*

***⌐ 1 Presence external air probe B2.***
*Sets the presence of probe NTC B2, the corresponding function must be selected using parameter HC.*
*0= probe absent*
*1= NTC CAREL probe*
***Range: 0to1 flag***
***Def.: 0***

***⌐ 2 Type of probe B3***
*Sets the type of probe B3 (0-20mA, 4-20mA, 0-1V).*
***N.B. This setting must also be accompanied by the setting of the jumper (B3 selection - see Fig. 5).***
*The corresponding function must be selected using parameter Hd.*
*0= probe absent*
*1= 0to1V or 0to20mA*
*2= 4to20mA*
***Range: 0to2 flags***
***Def.: 0***

***⌐ 3 Presence supply air probe B4***
*Sets the presence of NTC probe B4.*
*0= probe absent*
*1= NTC CAREL probe (also enables the corresp. alarm in cooling function, see parameter Pd.)*
***Range: 0to1 flag***
***Def.: 0***

***⌐ 4 Minimum value measured by input B3 at 0mA, 4mA or 0Vdc***
*This parameter allows the configuring of the minimum value for probe B3.*
***Range: 0to/5%rH, bar***
***Def.: 0***

***⌐ 5 Maximum value measured by input B3 at 20mA or 1Vdc***
*This parameter allows the configuring of the max. value for probe B3.*
***Range: /4to100%rH, bar***
***Def.: 100***

***⌐ 6 Calibration input B1***
*Corrects the value measured by B1.*
***Range: -6.0to6.0°C -10.8to10.8°F***
***Def.: 0.0***

***⌐ 7 Calibration input B2***
*Corrects the value measured by B2.*
***Range: -6.0to6.0°C -10.8to10.8°F***
***Def.: 0.0***

***⌐ 8 Calibration input B3***
*Corrects the value measured by B3.*
***Range: -10.0to10.0%rH, bar***
***Def.: 0.0***

***⌐ 9 Calibration input B4***
*Corrects the value measured by B4.*
***Range: -6.0to6.0°C -10.8to10.8°F***
***Def.: 0.0***

***⌐ A Digital filter***
*Stabilises the coefficient used in the digital filtering of the measured value.*
*High values for this parameter allow the elimination of any transitory disturbance at the analogue inputs (yet diminish the speed of measurement). The suggested value is 4.*
***Range: 1to15***
***Def.: 4***

**b Limitazione ingresso**
Consente di stabilire la massima variazione rilevabile dalle sonde in un ciclo di programma della macchina; in pratica le variazioni massime ammesse nella misura sono comprese tra 0,1 e 1,5 unità (bar, °C o °F a seconda della sonda e dell'unità di misura) ogni secondo circa.
Valori bassi del parametro consentono di limitare l'effetto di disturbi di tipo impulsivo. Valore consigliato 8.
**Range: 1…15**
**Def.: 8**

**C Unità di misura**
Consente di selezionare l'unità di misura della temperatura visualizzata. Al variare di tale parametro il µAC effettua **automaticamente** la conversione di tutti i parametri di configurazione (set point, differenziali, limiti di massima ecc.) tranne F5 e F6.
Sul display viene indica costantemente l'unità utilizzata.
0= viene utilizzato il grado Centigrado (°C).
1= viene utilizzato il grado Fahrenheit (°F).
**Range: 0…1 flag**
**Def.: 0**
**Nota: se la variazione da Centigradi a Fahrenheit, e viceversa, viene effettuata da supervisore, i parametri non vengono convertiti (cambia solo il valore letto dalle sonde di temperatura ed il simbolo sul display).**

## 6.2 r= parametri relativi alla regolazione

**r1 Set point temperatura (estate)**
Permette di impostare il set point di temperatura (diag. a fine paragrafo). Se il modello configurato tramite il parametro H1 è CW cool/heat, tale set rappresenta il set estivo (vedi parametro r9).
La sua attivazione avviene tramite l'ingresso digitale ID7.
**Range: rA…rb °C, °F**
**Def.: 20,0**

**r2 Differenziale raffreddamento**
Permette di impostare il differenziale in raffreddamento (vedi diagrammi a fine paragrafo).
**Range: 0,1…11,0 °C 0,1…19,8 °F**
**Def.: 3,0**

**r3 Differenziale riscaldamento**
Permette di impostare il differenziale in riscaldamento (vedi diagrammi a fine paragrafo).
**Range: 0,1…11,0 °C 0,1…19,8 °F**
**Def.: 2,0**

**r4 Zona neutra temperatura**
Permette di impostare la zona neutra (vedi diagrammi a fine paragrafo). Quando la temperatura misurata dalla sonda B1 si trova all'interno della zona neutra tutti gli attuatori sono spenti, esclusi i seguenti casi:
- il tempo minimo di ON o il ritardo spegnimento tra i due compressori non è ancora trascorso (C1,C5);
- i compressori (o la valvola) stanno funzionando in seguito ad una richiesta di deumidifica.

**Range: 0,1…20,0 °C 0,1…36,0 °F**
**Def.: 1,0**

**r5 Set point umidità**
Imposta il set point di umidità (vedi diagrammi a fine paragrafo).
**Range: rc…rd %rH**
**Def.: 50**

**r6 Differenziale umidificazione**
Imposta il differenziale in umidifica (vedi diagrammi a fine paragrafo).
**Range: 1…20 %rH**
**Def.: 4**

**r7 Differenziale deumidificazione**
Imposta il differenziale di deumidifica (vedi diagrammi a fine paragrafo).
**Range: 1…20 %rH**
**Def.: 3**

***b Input limit***
*Stabilises the maximum variation which can be measured by the probes in a machine program cycle; in practice, the maximum variations allowed in the measurements are between 0.1 and 1.5 units (bar, °C or °F depending on the probe and the unit of measure) per second approximately. Low values for this parameter allow the effect of impulsive-type disturbance to be limited. Suggested value 8.*
***Range: 1to15***
***Def.: 8***

***C Unit of measure***
*Sets the unit of measure for the temperature displayed. On changing this parameter the µAC **automatically** performs the conversion of all the configuration parameters (set point, differentials, maximum limits etc.), except for F5 and F6.*
*The display always indicates the unit in use.*
*0= degrees Centigrade (°C) used.*
*1= degrees Fahrenheit (°F) used.*
***Range: 0to1 flag***
***Def.: 0***
***Note: if the variation from Centigrade to Fahrenheit, and vice-versa, is performed by the supervisor, the parameters are not converted (only the value read by the temperature probes and the symbol on the display change).***

## *6.2 r= regulation parameters*

***r1 Temperature set point (cooling)***
*Sets the temperature set point (diag. at the end of the paragraph). If the model configured using parameter H1 is CW cool/heat, this set point represents the cooling set point (see parameter r9). This is activated by the digital input ID7.*
***Range: rAtorb °C, °F***
***Def.: 20.0***

***r2 Cooling differential***
*Sets the differential for cooling (see diagrams at the end of the paragraph).*
***Range: 0.1to11.0°C 0.1to19.8°F***
***Def.: 3.0***

***r3 Heating differential***
*Sets the differential for heating (see diagrams at the end of the paragraph).*
***Range: 0.1to11.0°C 0.1to19.8°F***
***Def.: 2.0***

***r4 Temperature dead zone***
*Sets the dead zone (see diagrams at the end of the paragraph). When the temperature measured by probe B1 is within the dead zone, all actuators are off, except for in the following cases:*
- *the minimum ON time or the OFF delay between the two compressors has not yet elapsed (C1,C5);*
- *the compressors (or the valve) are operating following a request for dehumidification.*

***Range: 0.1to20.0°C 0.1to36.0°F***
***Def.: 1.0***

***r5 Humidity set point***
*Sets the humidity set point (see diagrams at the end of the paragraph).*
***Range: rctord%rH***
***Def.: 50***

***r6 Humidification differential***
*Sets the humidific. differ. (see diagrams at the end of the paragraph).*
***Range: 1to20%rH***
***Def.: 4***

***r7 Dehumidification differential***
*Sets the dehumidific. differ. (see diag. at the end of the paragraph).*
***Range: 1to20 rH***
***Def.: 3***

**r8 Zona neutra controllo umidità**
Permette di impostare la zona neutra (vedi diagrammi a fine paragrafo). Quando l'umidità misurata dalla sonda B3 si trova all'interno di questa zona, l'uscita 0-10 V, che attiva l'umidificatore, vale 0 e la deumidifica non è attiva.
**Range: 1…20 %rH**
**Def.: 2**

**r9 Set point temperatura (inverno)**
Set point invernale per il modello CW cool/heat (H1= 2).
La sua attivazione avviene tramite l'ingresso digitale ID7.
**Range: rA…rb °C, °F**
**Def.: 18,0**

**rA Set minimo temperatura**
Limita il valore minimo dei parametri r1 e r9.
Con la compensazione del set, tramite sonda aria esterna, tale valore rappresenta anche il limite inferiore di escursione del set (vedi fig. 26).
**Range: -20…rb °C 4…rb °F**
**Def.: 0**

**rb Set massimo temperatura**
Limita il valore massimo dei parametri r1 e r9. Con la compensazione del set tramite sonda aria esterna, tale valore rappresenta anche il limite superiore di escursione del set (vedi fig. 26).
**Range: rA…60 °C rA…140 °F**
**Def.: 50**

**rc Set minimo umidità**
Limita il valore minimo impostabile tramite il parametro r5.
**Range: 0…rd %rH**
**Def.: 0**

**rd Set massimo umidità**
Limita il valore massimo impostabile tramite il parametro r5.
**Range: rc…100 %rH**
**Def.: 100**

**rE Tipo regolazione temperatura**
Seleziona il tipo di regolazione.
0= regolazione di tipo proporzionale
1= regolazione di tipo proporzionale + integrale.
**Range: 0…1 flag**
**Def.: 0**

**rF Tempo integrazione per azione P+I**
Costante di tempo per regolazione P+I. Trascorso il tempo impostato, se l'errore è rimasto costante, l'effetto dell'azione integrale è pari a quello proporzionale. La regolazione P+I garantisce la massima efficacia partendo da una regolazione proporzionale stabile.
La regozione P+I è attiva solo se il valore letto dalla sonda rientra all'interno del 110% della zona proporzionale.
L'integratore viene azzerato in stand-by, in sleep mode e in deumidifica.
**Range: 10…3600 s**
**Def.: 600**

**rG Autorità per compensazione**
Costante per compensazione del set di lavoro in base alla temperatura misurata dalla sonda B2 (vedi fig. 26).
**Range: -2,0…2,0**
**Def.: 0,5**

**rH Set point compensazione estate**
Fissa il Set (sulla temperatura esterna B2) oltre il quale inizia la compensazione (vedi fig. 26).
**Range: -20…60 °C -4…140 °F**
**Def.: 25,0**

**ri Set point compensazione inverno**
Fissa il Set (sulla temperatura esterna B2) al di sotto del quale inizia la compensazione (vedi fig. 26).
**Range: -20…60 °C -4…140 °F**
**Def.: 10,0**

***r8 Humidity control dead zone***
*Sets the dead zone (see diagrams at the end of the paragraph). When the humidity measured by probe B3 is within this zone, the 0-10V output, which activates the humidifier, is at 0 and dehumidification is not active.*
***Range: 1to20%rH***
***Def.: 2***

***r9 Temperature set point (heating)***
*Heating set point for the model CW cool/heat (H1= 2). This is activated by the digital input ID7.*
***Range: rAtorb°C, °F***
***Def.: 18.0***

***rA Minimum temperature set point***
*Limits the minimum value of parameters r1 and r9. With compensation of the set point, using the external air probe, this value also represents the lower limit for the excursion of the set point (see Fig. 26).*
***Range: -20torb°C 4torb°F***
***Def.: 0***

***rb Maximum temperature set point***
*Limits the maximum value of parameters r1 and r9. With compensation of the set point, using the external air probe, this value also represents the upper limit for the excursion of the set point (see Fig. 26).*
***Range: rAto60°C rAto140°F***
***Def.: 50***

***rc Minimum humidity set point***
*Limits the minimum value which can be set using parameter r5.*
***Range: 0tord%rH***
***Def.: 0***

***rd Maximum humidity set point***
*Limits the maximum value which can be set using parameter r5.*
***Range: rcto100%rH***
***Def.: 100***

***rE Type of temperature regulation***
*Selects the type of regulation.*
*0= proportional-type regulation*
*1= proportional + integral-type regulation.*
***Range: 0to1 flag***
***Def.: 0***

***rF Integration time for P+I action***
*Time constant for P+I regulation. Once the set time has elapsed, if the error is still constant, the effect of the integral action is equal as that for proportional. P+I regulation guarantees maximum effectiveness when starting from stable proportional regulation.*
*P+I regulation is active only if the value read by the probe is within 110% of the proportional zone.*
*The integrator is reset in stand-by, in sleep mode and in dehumidification.*
***Range: 10to3600s***
***Def.: 600***

***rG Authority for compensation***
*Constant for compensation of the operating set point based on the temperature measured by probe B2 (see Fig. 26).*
***Range: -2.0to2.0***
***Def.: 0.5***

***rH Cooling set point compensation***
*Establishes the set point (for external temperature B2) beyond which compensation begins (see Fig. 26).*
**Range: -20to60°C -4to140°F**
**Def.: 25.0**

***ri Heating set point compensation***
*Establishes the set point (for external temperature B2) below which compensation begins (see Fig. 26).*
***Range: -20to60°C -4to140°F***
***Def.: 10.0***

**rL Differenziale free cooling (solo per shelter)**
Imposta il differenziale per il consenso all'attivazione del free cooling (shelter), cioé ingresso aria esterna tramite apertura di una serranda. L'azione di free-cooling è condizionata dalla seguente relazione:

**B1-B2 > rL cioè (temp. ripresa - temp. aria esterna) > rL**

Il consenso viene interdetto con un differenziale relativo fisso di 1,5 °C (Pag. 22). Il consenso viene altresì negato se la sonda B2 è guasta. La percentuale di apertura della serranda è visibile sul display tramite le barrette verticali accanto al simbolo del ghiaccio, mentre l'accensione del compressore è indicata dal numero 1 sotto al simbolo stesso. Se è attivato il free-cooling in ON-OFF (Out3) le barrette possono essere tutte accese o spente a seconda dello stato della serranda.
**Range: 0…30 °C 0…54 °F**
**Def.: 9**

**rn Limite inferiore temperatura mandata**
Tale parametro rappresenta il limite minimo per la temperatura di mandata al di sotto del quale viene chiusa la serranda dello shelter. Con sonda B4 presente la regolazione diventa quella descritta in fig. 28. La percentuale di apertura della serranda, vedi fig. 27, viene ridotta in modo proporzionale fino alla completa chiusura se la temperatura di mandata risulta essere inferiore a **rn-3 °C**. Questo per impedire l'invio in ambiente di aria a temperatura troppo bassa.
Nelle configurazioni ED e CW si ha il progessivo spegnimento degli attuatori quando la temperatura di mandata scende al di sotto del set rn, il diferenziale è fisso a 3 °C. In deumidifica non viene effettuata alcuna limitazione della temperatura di mandata.
**Range: -20…30 °C -4…86 °F**
**Def.: 5**

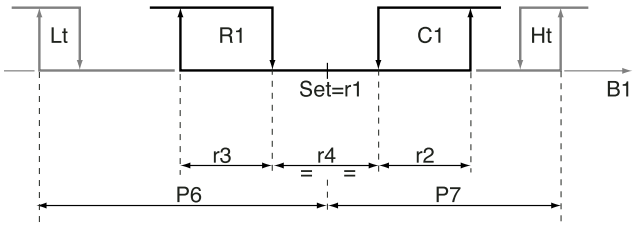
**ro Lettura sonda B2**
Temperatura aria esterna. **Appare solo con sonda installata.**

**rP Lettura sonda B3**
Percentuale di umidità o valore di pressione. **Solo con sonda installata.**

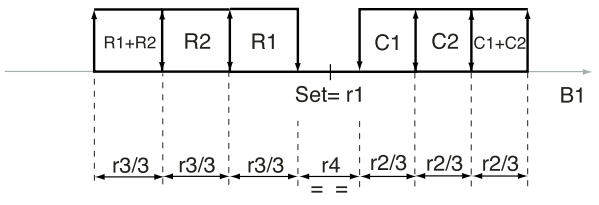
**rr Lettura sonda B4**
Temperatura aria mandata. **Appare solo con sonda installata.**

**rt Impostazione fasce orarie**
Con opzione orologio, permette di impostare le fasce orarie (vedi cap. 7)
**0=** fasce orarie disabilitate
**1=** ventilatore al minimo con monitorizzazione della temperatura
**2=** On/Off
**Range: 0…2 flags**
**Def.: 0**

**Diagrammi di regolazione della temperatura**




1 resistenza 1 compressore/*1 heating element 1 compressor* **-Fig. 21-**




2 resist. 2 compress. in binario / *2 element 2 compress. in binary*
**-Fig. 23-**

***rL Free cooling differential (only for shelters)***
*Sets the differential to trigger the activation of free cooling (shelters), that is external air inlet by the opening of a damper.*
*The free-cooling action is dependent on the following relationship:*

***B1-B2 > rL i.e. (room temperature - external air temperature) > rL***

*The trigger is excluded with a fixed relative differential of 1.5°C (P. 22).*
*The trigger is also excluded if probe B2 is malfunctioning.*
*The percentage of opening of the damper is shown on the display via the vertical bars next to the ice symbol, while the start-up of the compressor is indicated by the number 1 below the symbol itself.*
*If free-cooling is activated in ON-OFF (Out3), the bars may be either all on or all off depending on the status of the damper.*
***Range: 0to30°C 0to54°F***
***Def.: 9***

***rn Lower supply temperature limit***
*This parameter represents the minimum limit for the supply temperature below which the damper of the shelter is closed. With probe B4 present, the regulation is of the type described in Fig. 28. The percentage of opening of the damper, see Fig. 27, is reduced proportionally until it is completely closed if the supply temperature is lower than **rn-3°C**.*
*This prevents air of a too low temperature being sent into the room.*
*In the ED and CW configurations, the actuators turn OFF progressively, when the supply temperature falls below the m set, the differential is fixed at 3°C. During dehumidification, no limitation of the supply temperature is made.*
***Range: -20to30°C -4to86°F***
***Def.: 5***

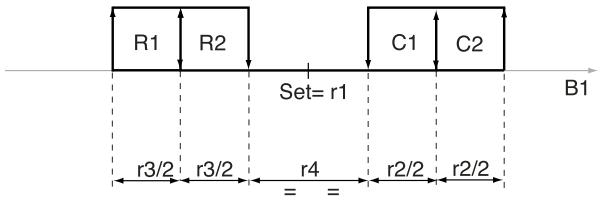
***ro Reading probe B2***
*External air temperature.* ***Only appears when the probe is installed.***

***rP Reading probe B3***
*Percentage of humidity or pressure value.* ***Only when the probe is installed.***

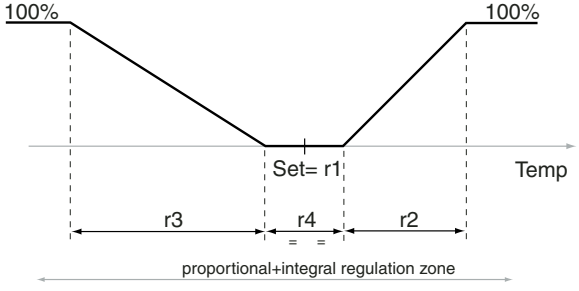
***rr Reading probe B4***
*Supply air temperature.* ***Only appears when the probe is installed.***

***rt Time band setting***
*Sets, if the clock option is installed, the time band mode (see chap. 7)*
***0=** time bands disabled*
***1=** fan on at minimum speed with temperature monitoring*
***2=** ON/OFF*
***Range: 0to2 flags***
***Def.: 0***

***Temperature regulation diagrams***

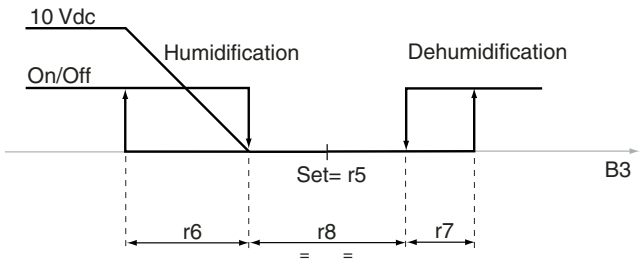



2 resistenze 2 compressori/*2 heating elements 2 compr.* **-Fig. 22-**



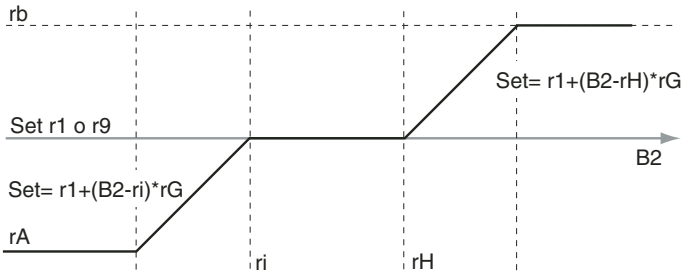

Valvola riscaldamento-raffredd. / Heating-Cooling Valve
**-Fig. 24-**

**Diagrammi di regolazione dell'umidità** ***Humidity regulation diagrams***



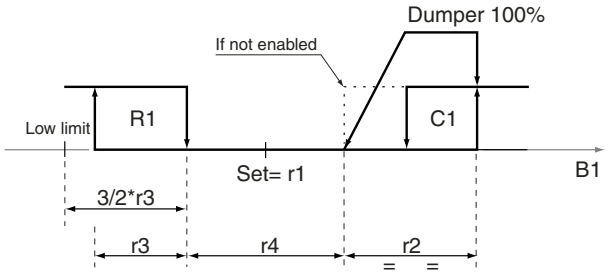

Regolazione umidificazione+deumidificazione / *Humidification+dehumidification regulation* **-Fig. 25-**

**Diagrammi di funzionamento in compensazione** ***Diagrams showing operation with compensation***

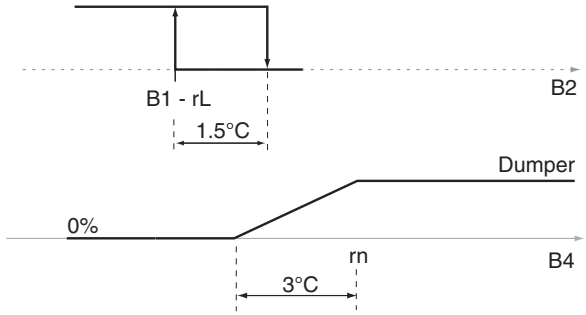



Compensazione set tramite sonda B2 / *Set-point compensation using probe B2* **-Fig. 26-**

**Diagrammi di funzionamento in free-cooling** ***Diagrams showing operation with free-cooling***




Shelter con free-cooling / *Shelters with free-cooling* **-Fig. 27-**




Consensi per il free-cooling / *Free-cooling control enable* **-Fig. 28-**

## 6. 3 c= parametri per la gestione del compressore

**c1 Tempo minimo di On**
Fissa il tempo minimo di attivazione del compressore, indipendentemente dalla richiesta (vedi diagramma a fine paragrafo).
**Range: 0…300 s**
**Def.: 60**

**c2 Tempo minimo di Off**
Fissa il tempo minimo di spegnimento del compressore, indipendentemente dalla richiesta (vedi diagramma a fine paragrafo).
**Range: 0…900 s**
**Def.: 60**

**c3 Tempo minimo tra due accensioni**
Stabilisce il tempo minimo tra due accensioni successive dello stesso compressore indipendentemente dalla richiesta. Ciò limita il numero di accensioni per ora (vedi diagramma a fine paragrafo).
**Range: 0…900 s**
**Def.: 360**

## *6. 3 c= compressor management parameters*

***c1 Minimum ON time***
*Sets the minimum activation time for the compressor, irrespective of request (see diagram at the end of the paragraph).*
***Range: 0to300s***
***Def.: 60***

***c2 Minimum OFF time***
*Sets the minimum off time for the compressor, irrespective of request (see diagram at the end of the paragraph).*
***Range: 0to900s***
***Def.: 60***

***c3 Minimum time between two start-ups***
*Sets the minimum time between two successive start-ups of the same compressor, irrespective of request. This limits the number of start-ups by time (see diagram at the end of the paragraph).*
***Range: 0to900s***
***Def.: 360***

**c4 Tempo minimo tra le accensioni di due compressori**
Stabilisce il tempo minimo che deve trascorrere tra le accensioni successive di 2 compressori (se selezionate configurazioni a 2 comp.). Ritardando l'inserimento dei compressori si evitano sovraccarichi della linea dovuti a spunti ravvicinati o contemporanei.
**Range: 0…300 s**
**Def.: 30**

**c5 Ritardo spegnimento tra i due compressori**
Stabilisce il tempo minimo che deve intercorrere tra gli spegnimenti di compressori diversi.
**Range: 0…300 s**
**Def.: 0**

**c6 Rotazione compressori**
Permette ai compressori di scambiare la priorità di partenza e di arresto.
0= rotazione disabilitata
1= rotazione abilitata (con H5= 2 o 5).
La gestione è di tipo FIFO, cioè il primo compressore ad essere acceso è il primo ad essere spento.
**Range: 0…1 flag**
**Def.: 0**

**c7 Ritardo accensione comp. dalla partenza ventilatore mandata**
Stabilisce il tempo minimo che deve intercorrere tra l'accensione del ventilatore e la partenza del compressore.
**Range: 0…300 s**
**Def.: 20**

**c8 Soglia contaore funzionamento compressori (e)**
Stabilisce il numero di ore di funzionamento del compressore oltre le quali viene segnalata la richiesta di manutenzione.
0= tale funzione non viene gestita.
**Range: 0…30000 ore**
**Def.: 0**

**c9 Contaore compressore 1**
**cA Contaore compressore 2**
Indica il numero di ore di funzionamento del compressore 1 e/o 2.

La pressione simultanea dei tasti ⬆ e ⬇ in fase di visualizzazione del parametro azzera il contaore (solo se eseguito in modalità USER o FACTORY) e cancella la richiesta di manutenzione, se abilitata.
La gestione dei contaore viene sospesa durante la fase di impostazione dei parametri, mentre l'effettiva scrittura in Eeprom avviene ogni 30 min.
**Range: 0…30000 ore**
**Def.: 0**

***c4 Minimum time between the start-up of two compressors***
*Sets the minimum time which must elapse between successive start-ups of 2 compressors (if configured for 2 comp.).*
*Delaying the activation of the compressors avoids overloading the line due to close or simultaneous peaks.*
***Range: 0to300s***
***Def.: 30***

***c5 OFF delay between the two compressors***
*Sets the minimum time which must elapse between the shutting down of different compressors.*
***Range: 0to300s***
***Def.: 0***

***c6 Compressor rotation***
*Allows the compressors to exchange priority for start-up and shut-down.*
*0= rotation disabled*
*1= rotation enabled (with H5= 2 or 5).*
*The rotation is FIFO, that is the fist compressor to be switched on is the first to be switched off.*
***Range: 0to1 flag***
***Def.: 0***

***c7 Comp. ON delay from supply fan start-up***
*Sets the minimum time which must elapse between the start-up of the fan and the activation of the compressor.*
***Range: 0to300s***
***Def.: 20***

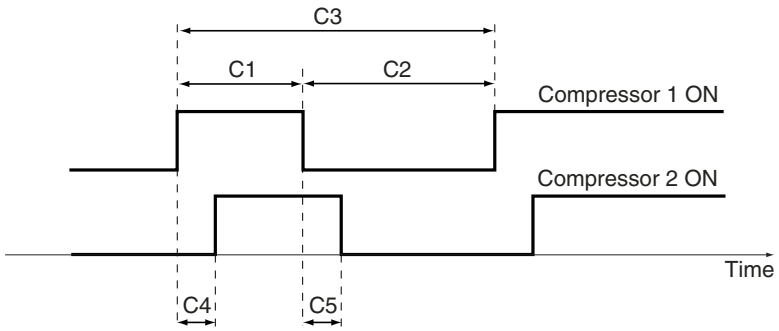
***c8 Hour counter threshold for compressor operation***
*Sets the number of hours of compressor operation beyond which the maintenance request is signalled.*
*0= this function is not handled.*
***Range: 0to30000 hours***
***Def.: 0***

***c9 Hour counter compressor 1***
***cA Hour counter compressor 2***
*Indicates the number of operating hours of compressor 1 and/or 2.*

*Pressing the ⬆ and ⬇ buttons together during the display of this parameter resets the hour counter (only in USER or FACTORY mode) and cancels the maintenance request, if enabled.*
*Management of the hour counter is suspended during the setting of the parameters, while the data is written to the EEPROM every 30 mins.*
***Range: 0to30000 hours***
***Def.: 0***

**Diagrammi delle tempistiche compressori**

***Diagrams of compressor times***




Versione a due compressori / *Version with 2 compressors* **-Fig. 29-**

## 6.4 F= parametri per la gestione delle ventole

**F1 Modalità funzionamento ventola**
Tale parametro va posto a 0 durante la fase di taratura dei limiti F2 e F3.
0= sempre On
1= regolazione velocità in proporzionale con velocità minima
2= regolazione velocità in proporzionale con Cut-Off
I valori 1 o 2 indicano funzionamento in modo proporzionale del ventilatore di mandata con Hb=0; se, invece, il taglio di fase viene utilizzato per il ventilatore di condensazione con Hb= 1 o 2 si ha il funzionamento descritto nei diagrammi a fine paragrafo. L'attivazione del ventilatore avviene solo con almeno uno dei compressori acceso. Nel caso di rottura della sonda B3 di condensazione il ventilatore viene forzato alla massima velocità, (F8) se la temperatura esterna (B2) è maggiore di 15 °C, invece, se la temperatura è inferiore a 15°C, il ventilatore gira ad una velocità media compresa tra i valori F7 e F8.
**Range: 0…2 flags**
**Def.: 1**

**F2 Soglia tensione minima per triac**
**F3 Soglia tensione massima per triac**
Nel caso di regolazione proporzionale della velocità del ventilatore è richiesta l'installazione della scheda di potenza MCHRTF*0A0.
In tal caso è necesario impostare i parametri F2 e F3 (vedi par. 9.2 "Calcolo velocità minima e massima") per ottenere in uscita, rispettivamente, la tensione minima e massima accettate dal motore utilizzato. I valori impostati non corrispondono all'effettiva tensione in Volt ma ad una unità di calcolo interno del µAC. Con il modulo CONV0/10A0, o con regolatori trifasi FCS3** porre F2= 0 e F3= 100.
**Range F2: 0…F4 step**
**Def. F2: 35**
**Range F3: F3…100 step**
**Def. F3: 75**

**F4 Durata impulso triac**
Rappresenta la durata, in millisecondi, dell'impulso di accensione del triac. Per motori con comportamento induttivo porre F4= 2, invece, per motori con comportamento capacitivo o con il modulo CONV0/10A0, o con regolatori trifasi FCS3** porre F4= 0.
**Range: 0…15 ms**
**Def.: 2**

**F5 Percentuale banda regolazione per minima velocità o temp./pressione minima velocità in condensazione**
**F6 Percentuale banda regolazione per massima velocità o temp./pressione massima velocità in condensazione**
Quando la regolazione di velocità dei ventilatori viene utilizzata per pilotare il ventilatore principale F5 ed F6 rappresentano la percentuale di banda di regolazione (vedi fig. 30); mentre quando si utilizza per pilotare il ventilatore di condensazione F5 ed F6 sono dei valori assoluti di temperatura o pressione (vedi fig. 31).
**Attenzione:** se il parametro indica una temperatura questa non viene automaticamente convertita in Fahrenheit al variare del parametro /C (vedi diagrammi a fine paragrafo).
**Range F5: 0…F6 %, °C, °F F5: /4…F6 bar**
**Def. F5: 20**
**Range F6: F5…100 % F5…158 °C, °F F5…/5 bar**
**Def. F6: 100**

**F7 Valore di minima uscita**
Consente di specificare un valore di velocità superiore al valore minimo, impostato tramite il parametro F2. (vedi diagrammi a fine paragrafo).
**Range: 0…F8 %**
**Def.: 10**

**F8 Valore di massima uscita**
Consente di specificare un valore di velocità inferiore al valore massimo, impostato tramite il parametro F3. (vedi diagrammi a fine paragrafo).
**Range: F7…100 %**
**Def.: 100**

## *6.4 F= fan management parameters*

***F1 Fan operating mode***
*This parameter must be set to 0 during the setting of limits F2 and F3.*
*0= always ON*
*1= proportional speed regulation with minimum speed*
*2= proportional speed regulation with cut-off*
*The values 1 or 2 indicate operation of the supply fan in proportional mode with Hb=0; if, on the other hand, phase-cut is used for the condensation fan with Hb= 1 or 2, operation is that described in the diagrams at the end of the paragraph. The fan is only activated when at least one of the compressors is on. In the case of condensation probe B3 malfunction, the fan is forced on at maximum speed, (F8), if the external temperature (B2) is greater than 15°C; on the other hand, if the temperature is lower than 15°C, the fan operates at an average of the values F7 and F8.*
***Range: 0to2 flags***
***Def.: 1***

***F2 Minimum triac voltage threshold***
***F3 Maximum triac voltage threshold***
*In the case of proportional fan speed regulation, installation of the power board MCHRTF*0A0 is required.*
*In this case parameters F2 and F3 (see par. 9.2 "Calculating minimum and maximum speed") must be set to obtain at the output the minimum and maximum voltage, respectively, accepted by the motor used. The values set do not correspond to the effective voltage in Volts, but to an internal calculation of the µAC. With the CONV0/10A0 module, or with FCS3** three-phase regulators, set F2= 0 and F3= 100.*
***Range F2: 0toF4 step***
***Def. F2: 35***
***Range F3: F3to100 step***
***Def. F3: 75***

***F4 Duration of triac impulse***
*Represents the width, in milliseconds, of the on pulse of the triac. For inductive-type motors set F4= 2; on the other hand, for capacitative-type motors or with the CONV0/10A0 module, or with FCS3** three-phase regulators, set F4= 0.*
***Range: 0to15ms***
***Def.: 2***

***F5 Regulation band percentage for minimum speed or temp./pressure for minimum speed in condensation***
***F6 Regulation band percentage for maximum speed or temp./pressure for maximum speed in condensation***
*When fan speed regulation is used to control the main fan, F5 and F6 represent the percentage of the regulation band (see Fig. 30); when on the other hand it is used to control the condensation fan, F5 and F6 are absolute temperature or pressure values (see Fig. 31).*

***Warning:** if the parameter indicates a temperature, this is not automatically converted to Fahrenheit on changing the parameter /C (see diagrams at the end of the paragraph).*
***Range F5: 0toF6%, °C, °F F5: /4toF6 bar***
***Def. F5: 20***
***Range F6: F5to100% F5to158°C, °F F5to/5 bar***
***Def. F6: 100***

***F7 Minimum output value***
*Specifies a speed value above the minimum value, set using the parameter F2. (see diagrams at the end of the paragraph).*
***Range: 0toF8%***
***Def.: 10***

***F8 Maximum output value***
*Specifies a speed value below the maximum value, set using the parameter F3. (see diagrams at the end of the paragraph).*
***Range: F7to100%***
***Def.: 100***

**F9 Soglia contaore ventilatore mandata**
Stabilisce il numero di ore di funzionamento del ventilatore oltre le quali viene segnalata la richiesta di manutenzione.
0= tale funzione non viene gestita.
**Range: 0…30000 ore**
**Def.: 0**

**FA Contaore ventilatore mandata**
Indica il numero di ore di funzionamento del ventilatore.

La pressione simultanea dei tasti ⬆ e ⬇ in fase di visualizzazione del parametro azzera il contaore (solo se eseguito in modalità USER o FACTORY) e cancella la richiesta di manutenzione, se abilitata.
**Range: 0…30000 ore**
**Def.: 0**

**Fb Soglia contaore filtro**
Stabilisce il numero di ore di funzionamento del filtro oltre le quali viene segnalata la richiesta di manutenzione.
0= tale funzione non viene gestita.
**Range: 0…30000 ore**
**Def.: 0**

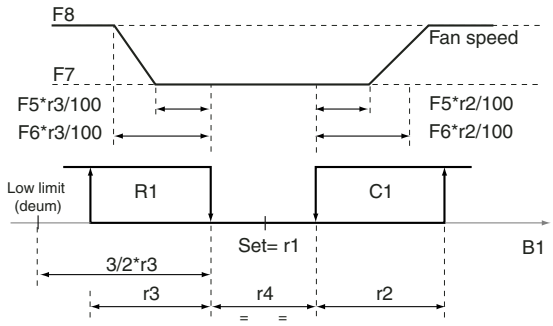
**FC Contaore filtro**
Indica il numero di ore di funzionamento del filtro.
Tale contaore viene incrementato se il ventilatore sta funzionando, quindi, fino al primo reset assume lo stesso valore di **FA**.

La pressione simultanea dei tasti ⬆ e ⬇ in fase di visualizzazione del parametro azzera il contaore (solo se eseguito in modalità USER o FACTORY) e cancella la richiesta di manutenzione, se abilitata.
**Range: 0…30000 ore**
**Def.: 0**

**Fd Ritardo spegnimento ventilatore mandata**
Permette di specificare il tempo, in secondi, durante il quale il ventilatore rimane acceso, dopo una commutazione ON => STAND-BY (tastiera, fasce orarie, ingresso digitale, rotazione).
**Range: 0…900 s**
**Def.: 20**

**FE Tempo di spunto ventole in condensazione**
Stabilisce il tempo di funzionamento alla massima velocità all'accensione delle ventole, se utilizzata per controllo di condensazione, per vincere l'inerzia meccanica del motore. Se posto a 0 la funzione non viene eseguita, ovvero le ventole vengono attivate alla minima velocità e poi controllate in base alla temperatura/pressione di condensazione.
**Range: 0…60 s**
**Def.: 4**

**Diagrammi di funzionamento del ventilatore principale in macchine di tipo ED o CW con F1= 1 / *Operating diagrams of the main fan in ED or CW machines with F1=1***




Controllo vent. in mandata */ Supply fan control* **-Fig. 30-**

***F9 Supply fan hour counter threshold***
*Sets the number of fan operating hours beyond which the maintenance request is signalled.*
*0= this function is not handled.*
***Range: 0to30000 hours***
***Def.: 0***

***FA Supply fan hour counter***
*Indicates the number of operating hours of the fan.*

*Pressing the ⬆ and ⬇ buttons together during the display of this parameter resets the hour counter (only in USER or FACTORY mode) and cancels the maintenance request, if enabled.*
***Range: 0to30000 hours***
***Def.: 0***

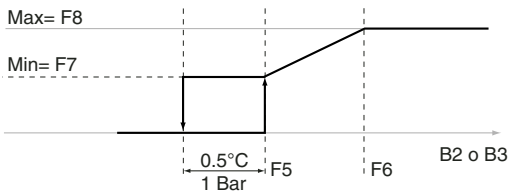
***Fb Filter hour counter threshold***
*Sets the number of filter operating hours beyond which the maintenance request is signalled.*
*0= this function is not handled.*
***Range: 0to30000 hours***
***Def.: 0***

***FC Filter hour counter***
*Indicates the number of operating hours of the filter. This hour counter is increased if the fan is working; as a result, until reset the first time has the same value as FA. Pressing the ⬆ and ⬇ buttons together during the display of this parameter resets the hour counter (only in USER or FACTORY mode) and cancels the maintenance request, if enabled.*
***Range: 0to30000 hours***
***Def.: 0***

***Fd Supply fan off delay***
*Specifies the time, in seconds, during which the fan stays on, after switching from ON => STAND-BY (keypad, time bands, digital input, rotation).*
***Range: 0to900s***
***Def.: 20***

***FE Fan pick-up time in condensation***
*Sets the operating time at maximum speed on starting-up the fans, if used for condensation control, to overcome the mechanical inertia of the motor. If set to 0 the function is not performed, that is the fans are activated at minimum speed and then controlled according to the condensation temperature/pressure.*
***Range: 0to60s***
***Def.: 4***

**Diagrammi di funzionamento del ventilatore di condensazione in macchine di tipo ED o shelter con F1= 2 / *Operating diagrams of the condensation fan in ED or shelter machines with F1=2***




Controllo vent. di condensazione / *Condensation fan control* **-Fig. 31-**

## 6.5 P= parametri per la gestione degli allarmi

**P1 Ritardo allarme di flusso dalla partenza ventilatore**
Stabilisce un ritardo nel riconoscimento dell'allarme di mancanza flusso aria (FL) alla partenza del ventilatore, ritardando anche l'attivazione degli attuatori per permettere la lettura di un eventuale allarme di flusso.
**Range: 0…250 s**
**Def.: 20**

**P2 Ritardo allarme di flusso durante il funzionamento**
Stabilisce un ritardo nel riconoscimento dell'allarme di mancanza flusso aria (FL) durante il funzionamento del ventilatore.
**Range: 0…90 s**
**Def.: 5**

**P3 Ritardo allarme bassa pressione dalla partenza compressore/i**
Stabilisce un ritardo nel riconoscimento dell'allarme di bassa pressione alla partenza del compressore/i per permettere il raggiungimento di una situazione di regime.
**Range: 0…250 s**
**Def.: 40**

**P4 Attivazione del buzzer**
Stabilisce il tempo di attivazione del buzzer in caso di allarme:
0= buzzer sempre disabilitato.
1…14= buzzer viene tacitato automaticamente trascorsi P4 minuti
15= buzzer rimane attivo fino a che non cessa la situazione di allarme (a ripristino automatico) oppure finché non viene premuto il tasto Alarm. Se dopo la tacitazione del buzzer, manuale o automatica a tempo, si presenta un nuovo allarme il buzzer viene riattivato.
**Range: 0…15 min**
**Def.: 0**

**P5 Reset allarmi**
Permette di selezionare varie configurazioni di reset (manuale o automatico) degli allarmi, vedi Tab. 3.
**Range: 1…5 flag**
**Def.: 1**

## *6.5 P= alarm management parameters*

***P1 Flow alarm delay from fan start-up***
*Sets a delay in recognising the air flow alarm (FL) on fan start-up, delaying as well the activation of the other actuators to allow the reading of a possible flow alarm.*
***Range: 0to250s***
***Def.: 20***

***P2 Flow alarm delay during operation***
*Sets a delay in recognising the air flow alarm (FL) during the operation of the fan.*
***Range: 0to90s***
***Def.: 5***

***P3 Low pressure alarm delay from compressor start-up***
*Sets a delay in recognising the low pressure alarm on the start-up of the compressor/s, to allow the operating conditions to be reached.*
***Range: 0to250s***
***Def.: 40***

***P4 Buzzer activation***
*Sets the activation time for the buzzer in the case of alarms:*
*0= buzzer always disabled.*
*1to14= buzzer is silenced automatically after P4 minutes*
*15= buzzer stays on until the alarm condition no longer exists (automatic reset) or until the Alarm button is pressed. If after silencing the buzzer, manually or automatically after a set time, a new alarm occurs, the buzzer is reactivated.*
***Range: 0to15 mins***
***Def.: 0***

***P5 Reset alarms***
*Allows the selection of various reset configurations (manual or automatic) for the alarms, see Tab. 3.*
***Range: 1to5 flag***
***Def.: 1***

| Cod. | Descrizione / *Description* | P5= 1 | P5= 2 | P5= 3 | P5= 4 | P5= 5 |
|---|---|---|---|---|---|---|
| E1 | sonda B1 / *probe B1* | auto | auto | man | auto | auto |
| E2 | sonda B2 / *probe B2* | auto | auto | man | auto | auto |
| E3 | sonda B3 / *probe B3* | auto | auto | man | auto | auto |
| E4 | sonda B4 / *probe B4* | auto | auto | man | auto | auto |
| EE | eeprom run / *EEPROM run* | man | man | man | man | man |
| EL | rete insuff. in scrittura eeprom *insuff. power on EEPROM write* | man | man | man | man | man |
| H1 | alta pressione C1 / *high pressure C1* | man | man | man | man | man |
| H2 | alta pressione C2 / *high pressure C2* | man | man | man | man | man |
| L1 | bassa pressione C1 / *low pressure C1* | man | auto | man | auto | auto |
| L2 | bassa pressione C2 / *low pressure C2* | man | auto | man | auto | auto |
| F1 | filtro sporco / *filter dirty* | man | auto | man | man | auto |
| FL | flusso / *flow* | man | auto | man | man | man |
| CF | flusso acqua / *water flow* | man | auto | man | auto | auto |
| r1 | resistenze / *heating elements* | man | man | man | man | man |
| At | temp. mandata / *supply temp* | man | auto | man | man | man |
| AH | umidificatore / *humidifier* | man | auto | man | auto | auto |
| Lt | bassa temperatura / l*ow temperature* | man | auto | man | auto | auto |
| ht | preallarme alta temp. / *high temperature prealarm* | man | auto | man | auto | auto |
| Ht | alta temperatura / *high temperature* | man | auto | man | auto | auto |
| LH | bassa umidità / *low humidity* | man | auto | man | auto | auto |
| HH | alta umidità / *high humidity* | man | auto | man | auto | auto |
| tC | termico comp. / *comp. thermal* | man | auto | man | man | auto |
| tF | termico fan / *fan thermal* | man | auto | man | man | auto |
| t1 | termico fan 1 / *fan 1 thermal* | man | auto | man | man | auto |
| t2 | termico fan 2 / *fan 2 thermal* | man | auto | man | man | auto |
| AL | generic grave / *serious generic* | Pb | Pb | Pb | Pb | Pb |
| FA | fumo-fuoco / *smoke-fire* | man | auto | man | man | auto |
| pA | mancanza rete (shelter) / *power fail (shelters)* | auto | auto | auto | auto | auto |
| CL | orologio / *clock* | man | man | man | man | man |

**Tab. 3**

**P6 Delta dal set effettivo per allarme bassa temperatura**
**P7 Delta dal set effettivo per allarme alta temperatura**
Permettono di impostare la soglia di allarme di bassa (Lt) e di alta (Ht) temperatura ambiente. Tale valore viene specificato come differenziale rispetto al set effettivo, a valle della eventuale operazione di compensazione (vedi parametri /1, rG, rH, Hc).
Questi allarmi, nel caso di reset automatico, hanno un'isteresi di 1 grado e sono generati solo con macchina attiva.
**Range P6/P7: 0…50 °C 0…90 °F**
**Def. P6/P7: 10**

**P8 Delta dal set per allarme bassa umidità**
**P9 Delta dal set per allarme alta umidità**
Permettono di impostare la soglia di allarme di bassa (LH) e alta (HH) umidità ambiente. Tale valore viene specificato come differenziale rispetto al set.
Questi allarmi, nel caso di reset automatico, hanno un'isteresi dell'1% e sono generati solo con macchina attiva e se presente l'umidificatore (per allarme di bassa umidità).
**Range P8/P9: 0…50 %rH**
**Def. P8/P9: 20**

**PA Ritardo allarme alta/bassa temperatura/umidità all'accensione**
Stabilisce il ritardo di riconoscimento degli allarmi di alta/bassa temperatura e umidità all'accensione della macchina, cioè dal passaggio di stato STAND-BY => ON.
**N.B.** L'allarme di bassa umidità è ritardato alla partenza dell'umidificatore. Questo per evitare allarme di bassa umidità al reset di un eventuale allarme umidificatore.
**Range: 0…150 min**
**Def.: 20**

**Pb Tipo gestione ingresso allarme generico ID5**
Stabilisce il tipo di allarme generato dall'ingresso ID5 (AL).
Tale funzione è abilitata solo con parametro H2= 0 e può essere gestito anche con macchina in stand-by (vedi tabella generale parametri P)
**Range: 0…6 flag**
**Def.: 1**

**PC Ritardo allarme generico**
Stabilisce il ritardo di attivazione dell'allarme generico ID5 (AL).
Tale ritardo è riferito all'attivazione dell'allarme stesso.
**Range: 0…250 s**
**Def.: 60**

**Pd Differenza temperatura ritorno-mandata per allarme temperatura mandata**
Stabilisce la differenza minima tra la temperatura di ritorno (misurata da B1) e quella di mandata (misurata da B4) affinché non venga generato l'allarme funzione raffreddamento (At).
Tale allarme ha un ritardo fisso di 4 minuti.
**N.B.** Per la generazione dell'allarme At, devono essere soddisfatte contemporaneamente le seguenti condizioni:
1. Temp. mandata > Temp. ripresa - Pd cioè B4 > B1-Pd.
2. Almeno un compressore acceso oppure valvola del freddo aperta più del 50%.
3. Entrambe le resistenze spente oppure valvola del caldo chiusa.
4. Trascorso il tempo di ritardo di 4 minuti.

Quando rilevato tale allarme, viene posto in blocco **solo** il compressore attivo.
**Range: 0…20 °C 0…36 °F**
**Def.: 3**

**PE Selezione ingresso ID4**
Se=1 al posto del termico resistenze attiva un allarme di fumo-fuoco.
**Range: 0…1 flag**
**Def.: 0**

**PF Selezione ingresso ID9**
Se=1 nelle macchine CW attiva un allarme di flusso acqua.
**Range: 0…1 flag**
**Def.: 0**

***P6 Delta from the effective set point for low temperature alarm***
***P7 Delta from the effective set point for high temperature alarm***
*Sets the alarm threshold for low (Lt) and high (Ht) ambient temperature. This value is specified as a differential in respect to the effective set point, considering any compensation operations (see parameters /1, rG, rH, Hc). These alarms, in the case of automatic reset, have an hysteresis of 1 degree and are generated only when the machine is active.*
***Range P6/P7: 0to50°C 0to90°F***
***Def. P6/P7: 10***

***P8 Delta from set point for low humidity alarm***
***P9 Delta from set point for high humidity alarm***
*Sets the alarm threshold for low (LH) and high (HH) ambient humidity. This value is specified as a differential in respect to the effective set point. These alarms, in the case of automatic reset, have an hysteresis of 1% and are generated only when the machine is active and if the humidifier is present (for low humidity alarm).*
***Range P8/P9: 0to50 %rH***
***Def. P8/P9: 20***

***PA High/low temperature/humidity alarm delay on start-up***
*Sets the delay in recognising the high/low temperature and humidity alarms on starting the machine, that is when switching from STAND-BY => ON.*
*N.B. The low humidity alarm is delayed by the start-up of the humidifier. This avoids low humidity alarms on resetting any humidifier alarms.*
***Range: 0to150 min***
***Def.: 20***

***Pb Type of management of generic alarm input ID5***
*Sets the type of alarm generated by input ID5 (AL). This function is enabled only with parameter H2= 0 and can be managed even with the machine in stand-by (see table on general parameters P)*
***Range: 0to6 flag***
***Def.: 1***

***PC Generic alarm delay***
*Sets the delay in activation of the generic alarm ID5 (AL).*
*This delay is refereed to the activation of the alarm itself.*
***Range: 0to250s***
***Def.: 60***

***Pd Return-supply temp. difference for supply temperature alarm***
*Sets the minimum difference between the return temperature (measured by B1) and the supply temperature (measured by B4) for the activation of the cooling function alarm (At).*
*This alarm has a fixed delay of 4 minutes.*
***N.B.*** *For alarm At to be generated, the following conditions must all be satisfied:*
1. *Supply temp. > Return temp. - Pd that is B4 > B1-Pd.*
2. *At least one compressor on or cooling valve open more than 50%.*
3. *Both heating elements off or heating valve closed.*
4. *Delay time of 4 minutes has elapsed.*

*When this alarm is detected, only the active compressor is blocked.*
***Range: 0to20°C 0to36°F***
***Def.: 3***

***PE ID4 input selection***
*If = 1 instead of the heating element thermal overload alarm it activates a smoke-fire alarm.*
***Range: 0to1 flag***
***Def.: 0***

***PF ID9 input selection***
*If = 1 in the CW machines, it activates a water flow alarm.*
***Range: 0to1 flag***
***Def.: 0***

**PG Abilitazione preallarme di alta temperatura**
Abilita il preallarme "ht" con un differenziale dal set pari a P7/2 ed isteresi di 1 grado (in questo caso conviene aumentare il valore di P7).
**Range: 0…1 flag**
**Def.: 0**

## 6.6 H= parametri generali di configurazione

**H1 Modello macchina**
Imposta il tipo di condizionatore da controllare.
**0= unità ED (vedi pag. 8 par. 4.2)**
**1= unità CW (vedi pag. 7 par. 4.1)**
**2= unità CW (E/I)**
**3= unità shelter (vedi pag. 9 par. 4.3)**
Per i modelli CW e ED la configurazione viene determinata dai parametri H5 e H6; per i modelli CW E/I e shelter, invece è fissa per quanto riguarda gli attuatori del freddo (vedi Tab. 1 pag. 6).

**CW E/I:** macchina ad acqua refrigerata con commutazione estate/inverno in centrale. In inverno la batteria viene alimentata con acqua calda e per la regolazione viene utilizzata la stessa valvola del freddo. L'ingresso ID7 effettua la commutazione da modo riscaldamento a raffreddamento e lo scambio del set-point con la seguente convenzione:

| | | |
|---|---|---|
| **ID7= 24 Vac** | **Inverno** | **Set= r9** |
| **ID7= 0** | **Estate** | **Set= r1** |

Quando la macchina si trova in modo estate, la presenza e il numero di resistenze dipende dal parametro H6; in modo inverno, invece gli attuatori del freddo risultano assenti e le resistenze inibite.

**Shelter:** macchina ad espansione diretta ad 1 compressore, 1 resistenza (opzionale - H6), controllo condensazione, gestione serranda per free-cooling e allarme mancanza rete (non è possibile il controllo dell'umidificatore). Per configurazione ingressi e uscite (vedi Tab. 1 pag. 6).
**Range: 0…3 flag**
**Def.: 0**

**H2 Numero di macchine in rotazione**
H2 è selezionato a 0 se la macchina è stand alone. Abilita la funzione di rotazione di una unità in stand-by in un gruppo di H2 unità (H2=1 non ha significato). Il valore di H2 specifica, infatti, il numero di unità totali collegate secondo lo schema riportato nel par. 4.4 a pag. 10.
Solo una unità si trova in stand-by, mentre le altre sono in funzione. Trascorso il tempo H4 si ha la rotazione dell'unità in riserva, secondo l'ordine progressivo di indirizzo.
Se una delle unità in funzione si arresta, a causa di un allarme, si riattiva automaticamente la macchina in stand-by. La condizione di allarme viene rivelata con un ritardo di 30 s.
**Range H2: 0…6 flags**
**Def. H2: 0**

**H3 Indirizzo per unità in rotazione**
Specifica l'indirizzo dell'unità, se due unità hanno lo stesso indirizzo verranno poste in stand-by contemporaneamente. L'unità di indirizzo 1 è il master, essa, tramite impulsi trasmessi per mezzo dell'uscita digitale Out7, invia alle altre il comando di commutazione ON => STAND-BY e viceversa. Tale comando, per sicurezza, viene ritrasmesso ogni 10 minuti.
**Range H3: 1…6**
**Def. H3: 1**

**H4 Tempo di rotazione tra più unità**
Permette di impostare l'intervallo di rotazione, allo scadere del quale l'unità spenta si accende, mentre quella di indirizzo successivo entra in stand-by. Impostando H4= 0 si attiva la modalità test con tempo di rotazione pari a 2 min. Questo stato di funzionamento è indicato tramite la lettera "C" sul "campo giorno" del display.
**Range H4: 0…250 ore**
**Def. H4: 0**

**H5 Modalità di funzionamento delle 2 uscite "freddo" Out1/ Out 2**
Stabilisce per i modelli ED e CW (H1=1 o 2) il tipo degli attuatori del freddo collegati, vedi tabella seguente.
**Range: 1…5 flags**
**Def.: 1**

***PG High temperature prealarm enabling***
*It enables the "ht" prealarm with a differential from the set equal to P7/2 and hysteresis of 1 degree (in this case it is better to increase the P7 value).*
***Range: 0to1 flag***
***Def.: 0***

## *6.6 H= general configuration parameters*

***H1 Machine model***
*Sets the type of air-conditioning unit to be controlled.*
***0= ED unit (see p. 8 par. 4.2)***
***1= CW unit (see p. 7 par. 4.1)***
***2= CW unit (C/H)***
***3= shelter unit (see p. 9 par. 4.3)***
*For models CW and ED, the configuration is determined by parameters H5 and H6; for models CW C/H and shelters, on the other hand, it is set according to the cooling actuators (see Tab. 1 p. 6).*

***CW C/H:** machine using refrigerated water with central cooling/heating switching. In heating mode the battery is supplied with hot water, and the cooling valve is used for regulation. Input ID7 performs the switching from heating to cooling and the exchange of the set-point, as follows:*

| | | |
|---|---|---|
| ***ID7= 24Vac*** | ***Heating*** | ***Set= r9*** |
| ***ID7= 0*** | ***Cooling*** | ***Set= r1*** |

*When the machine is in cooling mode, the presence and the number of heating elements depends on parameter H6; in heating mode, on the other hand, the cooling actuators are considered absent and the heating elements inhibited.*
***Shelters:** direct expansion machine with 1 compressor, 1 heating element (optional - H6), condensation control, damper management for free-cooling and no power alarm (no humidifier control possible). For the configuration of the inputs and outputs (see Tab. 1 p. 6).*
***Range: 0to3 flag***
***Def.: 0***

***H2 Number of machines in rotation***
*H2 is setting at 0 in stand alone machine. Enables the rotation function of a unit in stand-by within a group of H2 units (H2=1 no meaning). The value of H2 in fact specifies the total number of units connected according to the diagram in par. 4.4 on p. 10.*
*Only one unit is in stand-by, while the others are in operation.*
*Once the time H4 has elapsed, the rotation of the unit in reserve occurs, according to the progressive order of the addresses. If one of the units in operation stops, due to an alarm, the machine in stand-by is automatically re-activated. The alarm condition is detected after a delay of 30s.*
***Range H2: 0to6 flags***
***Def. H2: 0***

***H3 Address of unit in rotation***
*Specifies the address of the unit; if two units have the same address they are placed in stand-by together. The unit with address 1 is the master, and this unit, with impulses transmitted via digital output Out7, sends the other units the command to switch from ON => STAND-BY and vice-versa. This command is re-sent every 10 minutes.*
***Range H3: 1to6***
***Def. H3: 1***

***H4 Rotation time between a series of units***
*Sets the rotation interval, after which the unit off is turned on, while the unit with the subsequent address goes to stand-by. Setting H4= 0 activates test mode, with a rotation time of 2 mins. This operating mode is indicated by the letter "C" in the "day field" on the display.*
***Range H4: 0to250 hours***
***Def. H4: 0***

***H5 Operating mode of the 2 "cooling" outputs Out1/ Out 2***
*Sets for models ED and CW (H1=1 or 2) the type of cooling actuators connected, see table below.*
***Range: 1to5 flags***
***Def.: 1***

| H5 | Significato / *Meaning* | ID7 | ID8 | ID9 | ID10 |
|---|---|---|---|---|---|
| **1** | 1 compressore su OUT1<br>*1 compressor on OUT1* | Alta pressione<br>*High pressure* | Bassa pressione<br>*Low pressure* | Termico compressore<br>*Compressor overload* | Termico ventilatore<br>*Fan overload* |
| **2** | 2 compressori su OUT1 e OUT2<br>*2 compressors on OUT1 and OUT2* | Alta pressione C1<br>*High pressure C1* | Bassa pressione C1<br>*Low pressure C1* | Alta pressione C2<br>*High pressure C2* | Bassa pressione C2<br>*Low pressure C2* |
| **3** | Valvola a tre punti con apertura OUT1 chiusura su OUT2<br>*Three-point valve with opening OUT1 closing on OUT2* | | | | Termico ventilatore<br>*Fan overload* |
| **4** | 2 compressori di potenze diverse OUT1 OUT2 quello di maggior potenza collegato a OUT2<br>*2 different power compressors OUT1 OUT2, the more powerful connected to OUT2* | Alta pressione C1<br>*High pressure C1* | Bassa pressione C1<br>*Low pressure C1* | Alta pressione C2<br>*High pressure C2* | Bassa pressione C2<br>*Low pressure C2* |
| **5** | 2 compressori in tandem<br>*2 compressors in tandem* | Alta pressione<br>*High pressure* | Bassa pressione<br>*Low pressure* | Termico compressore<br>*Compressor overload* | Termico ventilatore<br>*Fan overload* |

**Tab. 4**

**H6 Modalità di funzionamento delle 2 uscite "caldo" Out 3 / Out4**
Stabilisce per i modelli ED e CW (H1=1,2) il tipo degli attuatori del caldo collegati.
**0=** Nessun attuatore del caldo collegato. Se il ventilatore è controllato in proporzionale per ogni valore di temperatura inferiore al set esso rimane a velocità minima.
**1=** 1 resistenza collegata all'uscita OUT3.
**2=** 2 resistenze collegate alle uscite OUT3 e OUT4.
**3=** Valvola a tre punti con il comando di apertura collegato all'uscita OUT3 e quello di chiusura all'uscita OUT4.
**4=** 2 resistenze di potenze diverse collegate alle uscite OUT3 e OUT4, quella di maggior potenza deve essere collegata a OUT4
**Range: 0…4 flags**
**Def.: 1**

**H7 Tempo di escursione valvola 3P o serranda**
Permette di impostare il tempo di escursione della valvola oppure, se il modello scelto è lo shelter, della serranda.
**Range: 0…600 s**
**Def.: 150**

***H6 Operating mode of the 2 "heating" outputs Out 3 / Out4***
*Sets for models ED and CW (H1=1,2) the type of the heating actuators connected.*
***0=*** *No heating actuator connected. If the fan is controlled in proportional mode, for temperature values lower than the set point this remains at minimum speed.*
***1=*** *1 heating element connected to output OUT3.*
***2=*** *2 heating elements connected to outputs OUT3 and OUT4.*
***3=*** *Three-point valve with opening control connected to output OUT3 and closing to output OUT4.*
***4=*** *2 different power heating elements connected to outputs OUT3 and OUT4, the more powerful must be connected to OUT4*
***Range: 0to4 flags***
***Def.: 1***

***H7 Excursion time for 3P valve or damper***
*Sets the excursion time for the valve or, if the shelter model is chosen, of the damper.*
***Range: 0to600s***
***Def.: 150***

### 6.6.1 Gestione valvola del caldo/freddo e serranda

Quando l'attuatore per il controllo del caldo o del freddo è costituito da una valvola a tre punti, lo strumento nel momento in cui viene alimentato si pone nello stato di PRE-START: i simboli sul display indicano immediatamente lo stato degli attuatori richiesto dalla funzione di regolazione, le valvole, invece, vengono chiuse del tutto per un tempo pari al valore impostato tramite il parametro H7 + 10%. Questo consente di riallineare la posizione delle stesse prima di iniziare la regolazione. Durante il funzionamento normale il controllo della temperatura avviene aprendo o chiudendo la valvola con variazioni minime del 5% della corsa totale. Se viene richiesto di aprire la valvola fino ad oltre il 90%, il controllo forza prima l'apertura completa per un tempo proporzionale al tempo totale H7 e superiore a quello necessario, per portare poi la stessa al valore richiesto. Allo stesso modo se viene richiesto di chiudere la valvola al di sotto del 10%, il controllo la chiude completamente per posizionarla poi al valore richiesto.
Per riaggiustare eventuali piccoli spostamenti della valvola, quando questa lavora completamente aperta o chiusa, il controllo forza l'apertura o chiusura totale ogni 10 minuti, 60 minuti se si trova in stand-by o in sleep mode da fasce orarie, per un tempo pari a H7/2 secondi.
Queste azioni, come del resto la chiusura totale della valvola all'accensione dello strumento, permettono di calcolare con precisione lo stato di apertura della valvola, anche se non esiste una retroazione diretta tra valvola e attuatore. Le stesse considerazioni valgono anche se si usa come attuatore del freddo nella modalità shelter una serranda motorizzata con comando a 3 punti.

### *6.6.1 Heating/cooling valve and damper management*

*If the actuator for the control of heating or cooling is of a three-point valve, when the instrument is connected to the power supply it goes to PRE-START status: the symbols on the display immediately indicate the status of the actuators required by the regulation, the valves, on the other hand, are completely closed for a period equal to the value set by parameter H7 + 10%. This allows a realignment of the position of the latter before beginning regulation. During normal operation, temperature control occurs by opening or closing the valve, with minimum variations of 5% of total stroke. If the valve is required to open to more than 90%, the control first completely opens the valve for a period proportional to the total time H7 and longer than that necessary, before returning to the value required. In the same way, if the valve is required to close below 10%, the control completely closes it before returning to the position of the required value.*
*To adjust for any small valve movements, when the latter is operating either completely open or closed, the control forces the complete opening or closing every 10 minutes, or 60 minutes in stand-by or time band sleep mode, for a period of H7/2 seconds. These procedures, like the complete closing of the valve on instrument start-up, allow the degree of opening of the valve to be accurately calculated, even if there is no direct retroaction between valve and actuator. The same considerations are valid if a motorised damper with 3-point control is used as the cooling actuator in shelter mode.*

**H8 Presenza umidificatore**
**0=** gestione umidificatore disattivata
**1=** viene attivata la gestione dell'umidificatore, la generazione dei relativi allarmi e la visualizzazione del simbolo sul display.
**Range: 0…1 flag**
**Def.: 0**

***H8 Humidifier presence***
***0=*** *humidifier management disabled*
***1=*** *enable the humidifier management , the generation of corresponding alarms and the display of the relative symbol.*
***Range: 0to1 flag***
***Def.: 0***

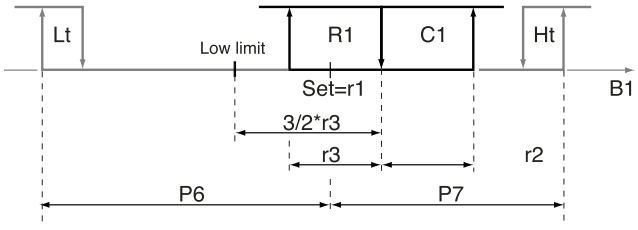
**H9 Tipo deumidificazione**
Seleziona la modalità della deumidificazione.
**0, 1=** con accensione del compressore 1, 2
**2=** con accensione dei due compressori
**3=** con parzializzazione rampa freddo (attiva al 100% l'uscita)
**4=** con riduzione velocità ventilatore
**5, 6, 7, 8=** azione combinata 4+0, 4+1, 4+2, 4+3
**9=** nessuna azione
Per l'attivazione deumidifica vedi diagramma fig. 25 a pag. 22.
**Range: 0…9 flags**
**Def.: 0**

### 6.6.2 Deumidifica

La gestione della deumidifica è regolata come illustrato in fig. 25 a pag. 22 ed il suo intervento abilita la relativa uscita digitale out7 (con HA = 0 o 1), inoltre è possibile avere altre azioni sugli altri attuatori del freddo e/ ventilatore principale selezionando il parametro H9. Tale stato è segnalato sul display dal simbolo delle gocce, ed il suo intervento è subordinato alla gestione della temperatura e in caso di superamento del LOW LIMIT pari a 3/2*r3 (vedi figura 21, 22 e fig. 21/b, 22/b) si ha la disattivazione degli attuatori del freddo, ignorando di fatto la richiesta di deumidifica, quelli del caldo continuano a funzionare secondo il tipo di regolazione impostato, fino a che la temperatura non raggiunge il SET dinamico, che annulla la zona neutra spostando la regolazione degli attuatori del caldo verso quelli del freddo finché permane la condizione di deumidifica. Oltre tale limite riprende il ciclo di deumidifica. Se viene selezionata la riduzione di velocità del ventilatore, questa diventa pari a quella impostata tramite il parametro F7. Nella configurazione shelter, l'attivazione della deumidifica inibisce l'apertura della serranda per 2 ore.

**HA Funzione del relè di deumidificazione/umidificazione**
Stabilisce la funzione del relè Out 7.
**0=** Relè eccitato in deumidificazione
**1=** Relè diseccitato in deumidificazione
**2=** Relè d'allarme per segnalazioni non gravi
**3=** Uscita per controllo rotazione
**4=** Relè eccitato in umidificazione
**5=** Relè diseccitato in umidificazione
**6=** Ventilatore 2 acceso in deumidificazione
**7=** Ventilatore 2 spento in deumidificazione
Tale relè può, in alternativa, essere utilizzato come relè di allarme ausiliario, cioè per segnalare allarmi non gravi (vedi Tab. 5 a pag. 35).
In quest'ultimo caso la logica di attivazione segue quella del relè di allarme principale Out 6, determinata dal parametro HF.
Se HA= 3 il relè assume funzione di controllo per più unità in rotazione, vedi H2-H4. In questa configurazione C7 viene tenuto aperto in modo continuo al verificarsi di un allarme grave. Se HA= 4 o 5 l'azione di deumidifica è quella selezionata dal parametro H9.
Se HA= 6 o 7 si ha la gestione di due ventilatori di mandata, il secondo collegato sull'Out7 il cui ritardo di accensione dal primo è fisso a 5 s., mentre il primo rimane sull'Out5. L'attivazione viene indicata nel display dalle cifre "1" e "2" sotto il simbolo ventilatore.
In questo caso i termici vengono collegati all'ingresso ID2 e ID4 e se entrambi sono attivi viene forzato l'allarme di flusso FL.
**Range: 0…5 flags**
**Def.: 0**

**Diagrammi di regolazione della temperatura in deumidifica**




1 resistenza 1 compressore/*1 heating element 1 compressor* **-Fig. 21/b-**

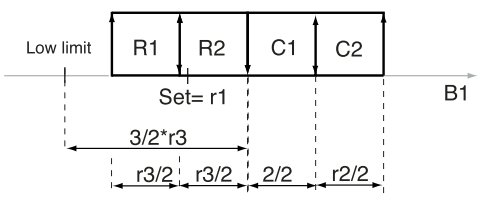
***H9 Type of dehumidification***
*Selects the dehumidification mode.*
***0, 1=*** *with start-up of compressor 1, 2*
***2=*** *with start-up of both compressors*
***3=*** *with capacity-controlled cooling ramp (it activates the output at 100%)*
***4=*** *with fan speed reduction*
***5, 6, 7, 8=*** *combined action 4+0, 4+1, 4+2, 4+3*
***9=*** *no action*
*The dehumidification function see the diagram Fig. 25 on p. 22.*
***Range: 0to9 flags***
***Def.: 0***

### *6.6.2 Dehumidification*

*Dehumidification management is regulated as illustrated in Fig. 25 on p. 22, and its activation enables the corresponding digital output out7 (with HA = 0 or 1); in addition other actions can be performed on other cooling and main fan actuators by selecting parameter H9. This status is signalled on the display by the drip symbol, and its activation is subject to temperature management. In the case of exceeding the LOW LIMIT, equal to 3/2*r3 (see fig. 21, 22 and fig. 21/b, 22/b) the cooling actuators are deactivated, ignoring indeed the request for dehumidification, while the heating actuators continue operating according to the type of regulation set, until the temperature reaches the SET the dynamic SET, which cancels the neutral zone moving the regulation of the heating actuators towards the cooling actuators as long as the dehumidification progress lasts.*
*Beyond this limit the dehumidification cycle recommences.*
*If fan speed reduction is selected, this is equal to the value set by parameter F7. In the shelter configuration, the activation of the dehumidification inhibits the opening of the damper for 2 hours.*

***HA Function of the dehumidification/humidification relay***
*Sets the function of the relay Out 7.*
***0=*** *Relay energised in dehumidification*
***1=*** *Relay de-energised in dehumidification*
***2=*** *Alarm relay for non-serious signals*
***3=*** *Output for rotation control*
***4=*** *Relay energised in humidification*
***5=*** *Relay de-energised in humidification*
***6=*** *Fan 2 on in dehumidification*
***7=*** *Fan 2 off in dehumidification*
*This relay can alternatively be used as an auxiliary alarm relay, that is to signal non-serious alarms (see Tab. 5 on p. 35).*
*In the latter case, the activation logic follows that of the main alarm relay Out 6, determined by parameter HF.*
*If HA= 3 the relay assumes the control of a series of units in rotation, see H2-H4. In this configuration, C7 is kept open continuously in the case of a serious alarm. If HA= 4 or 5 the dehumidification action is as selected by H9.*
*If HA=6 or 7 two supply fans are managed, the second one connected to the Out7 which the startup delay is fixed at 5s, while the first one remains at OUT5. The activation is shown in the display by the figures "1" and "2" under the fan symbol. In this case, the thermals are connected to the ID2 and ID4 inputs and if both of them are ON the FL flow alarm is forced.*
***Range: 0to5 flags***
***Def.: 0***

***Dehumidification temperature regulation diagrams***




2 resistenze 2 compressori/*2 heating elements 2 compr.* **-Fig. 22/b-**

**Hb Funzione uscita Y2 (taglio di fase)**
Configura l'uscita Y2, i cui parametri di lavoro sono F1…F8.
**0=** l'uscita Y2 controlla la velocità del ventilatore di mandata in modo proporzionale, seguendo la curva di fig. 30 pag. 25.
Se la macchina viene posta in stand-by, l'uscita Y2 viene disattivata dopo il tempo Fd e contemporaneamente all'uscita OUT5.
**1=** l'uscita Y2 controlla la velocità del ventilatore di condensazione, tramite la sonda B3 (pressione).
**2=** l'uscita Y2 controlla la velocità di condensazione, tramite la sonda B2 (temperatura).
**Range: 0…2 flags**
**Def.: 0**

### 6.6.3 Controllo di condensazione

Per le macchina ad espansione diretta (ED o shelter ) è possibile utilizzare l'uscita Y2 per il controllo dei ventilatori di condensazione (moduli MCHRTF**A0) integrando anche questa funzione nella regolazione del µAC. Per le macchine ad espansione diretta si utilizza la sonda di temperatura B2 sia che si tratti di monocompressore che bicompressore, invece per le unità "shelter" si utilizza la sonda attiva B3 che può essere di pressione o di temperatura. Per il diagramma di funzionamento vedi fig. 31 a pag. 25 e i parametri da selezionare sono Hb, Hc, Hd oltre a parametri dei ventilatori di tipo "F".

**Hc Funzione della sonda B2**
**0=** la sonda B2 viene utilizzata per la compensazione del SET come rappresentato in Fig. 26 a pag. 22.
**1=** la sonda B2 viene utilizzata per la gestione del free-cooling tramite uscita 0…10 Vdc.
**2=** le uscite SSR, OUT3 e OUT4 vengono utilizzate per gestire una serranda da free-cooling con comando a 3 punti.
**3=** l' uscita OUT3 viene utilizzata per gestire una serranda da free-cooling di tipo ON-OFF.
**4=** la sonda B2 viene utilizzata per il controllo della condensazione.
**Range: 0…3 flags**
**Def.:0**

### 6.6.4 Funzione di free-cooling

Nelle unità di tipo shelter per il risparmio energetico è possibile, tramite la serranda sull'aria esterna (uscita Y1 per 0-10Vdc o a tre punti con le uscite out3 e 4 o di tipo on-off con l'uscita out3), fare la funzione di free-cooling utilizzando la sonda esterna B2 ed impostando un differenziale di temperatura di attivazione, tramite il parametro rL, inoltre tale funzione è limitata impostando un set rn sulla temperatura di mandata B4. Per i diagrammi di funzionamento vedi fig. 27 e 28 a pag. 22 e i parametri da selezionare sono Hc, rL e rn.
Gli allarmi del compressore e l'allarme PA abilitano l'apertura della serranda indipendentemente dalla temperatura esterna.

**Hd Funzione della sonda B3**
Abilita la sonda B3 come sensore di umidità oppure per il controllo della pressione di condensazione.
**0=** Controllo umidità
**1=** Controllo condensazione
**Range: 0…1 flag**
**Def.:0**

**HE Ingresso digitale On/Off**
Abilita l'ingresso digitale ID1 come On/Off remoto.
Con ingresso aperto si ha lo stato di stand-by della macchina (segnalato dal simbolo "OFF" sul display), applicando invece, la tensione di 24 V si ha l'accensione dell'unità (segnalata dal simbolo "ON" sul display).
**0=** Assente
**1=** Presente
**Range: 0…1 flag**
**Def.: 0**

***Hb Function of output Y2 (phase-cut)***
*Defines the output Y2, whose operating parameters are F1toF8.*
***0=*** *output Y2 controls the speed of the supply fan proportionally, following the curve in Fig. 30, p. 25.*
*If the machine is in stand-by, output Y2 is deactivated after a time Fd and together with output OUT5.*
***1=*** *output Y2 controls the speed of the condensation fan, using probe B3 (pressure).*
***2=*** *output Y2 controls the speed of the condensation fan, using probe B2 (temperature).*
***Range: 0to2 flags***
***Def.: 0***

### *6.6.3 Condensation control*

*For direct expansion machines (ED or shelter), output Y2 can be used to control the condensation fans (modules MCHRTF**A0), integrating this function in the regulation of the µAC. For direct expansion machines, temperature probe B2 is used both for one or two compressors; on the other hand, for "shelter" units, the active probe B3 is used, either for pressure or temperature. For the operating diagram, see Fig. 31 on p. 25. The parameters to be selected are Hb, Hc, Ho, as well as the fan parameters "F".*

***Hc Function of probe B2***
***0=*** *probe B2 is used for the compensation of the SET POINT as represented in Fig. 26 on p. 22.*
***1=*** *probe B2 is used for free-cooling management, via the 0to10Vdc output.*
***2=*** *outputs SSR, OUT3 and OUT4 are used to manage a free-cooling damper with 3-point control.*
***3=*** *output OUT3 is used to manage an ON-OFF free-cooling damper.*
***4=*** *probe B2 is used for condensation control.*
***Range: 0to3 flags***
***Def.:0***

### *6.6.4 Free-cooling function*

*In shelter-type units, energy saving can be achieved using a damper on the external air (output Y1 for 0-10Vdc or three-point with outputs out3 and 4, or on-off type with output out3) to control the free-cooling function, using the external probe B2, and setting an activation temperature differential using the parameter rL. In addition, this function is limited by setting a set point rn for the supply temperature B4.*
*For the operating diagrams, see Fig. 27 and 28 on p. 22.*
*The parameters to be selected are Hc, rL and rn.*
*The compressor alarms and PA alarm enable the opening of the damper independently of the external temperature.*

***Hd Function of probe B3***
*Enables probe B3 as humidity sensor or for the control of condensation pressure.*
***0=*** *Humidity control*
***1=*** *Condensation control*
***Range: 0to1 flag***
***Def.:0***

***HE ON/OFF digital input***
*Enables the digital input ID1 as Remote ON/OFF.*
*With the input open the machine is in stand-by (signalled by the symbol "OFF" on the display); applying, on the other hand, a voltage of 24V the unit is turned on (signalled by the symbol "ON" on the display).*
***0=*** *Absent*
***1=*** *Present*
***Range: 0to1 flag***
***Def.: 0***

**HF Logica del relè di allarme (Out 6)**
Consente di selezionare la logica del relè, normalmente eccitato o diseccitato, e la categoria di allarmi che attivano tale relè, vedi Tab. 5 a pag. 35.
**0=** Relè diseccitato per tutti gli allarmi
**1=** Relè eccitato per tutti gli allarmi
**2=** Relè diseccitato per i soli allarmi gravi
**3=** Relè eccitato per i soli allarmi gravi
**Range: 0…3 flags**
**Def.: 0**

**HG Ritardo all'accensione**
Imposta il tempo di attesa ad ogni commutazione da stand-by a ON oppure al POWER-ON. Durante tale fase il led verde viene acceso ma tutti gli attuatori rimangono spenti.
**Range: 0…300 s**
**Def.:0**
**HH Password USER**
Seleziona il valore della password utente da impostare per accedere ai parametri USER.
**Range: 0…200**
**Def.:22**

**Hi Blocca tastiera**
Impedisce la modifica dei parametri a personale non autorizzato.
**0=** nessun blocco
**1=** blocco di tutte le funzioni di modifica parametri e reset allarmi e contaore (tranne accesso alla password user e e lo spegnimento da tastiera), sul display appare il simbolo del lucchetto.
**Range: 0…1 flag**
**Def.:0**

**HL Set di parametri**
Permette di ottenere varie configurazioni dei livelli di parametri (vedi Tab. 2 dei parametri all'inizio del capitolo 6).
**Range: 0…3 flags**
**Def.:0**

**Hn Selezione visualizzazione sul display**
Seleziona quali valori visualizzare sul display, in condizioni normali: temperatura e umidità lette dalle sonde oppure i set point o, se presente la scheda orologio, l'ora corrente.

In quest'ultimi due casi la pressione del tasto ⬇ mostra i valori letti dalle sonde.
**0=** Sonde B1, B3 (se presente)
**1=** Set-point di temperatura e umidità (se presente)
**2=** Giorno ed ora (se presente l'orologio)
**Range: 0…2 flags**
**Def.: 0**

**Ho Indirizzo seriale rete supervisione**
Imposta l'indirizzo del dispositivo nella rete di supervisione RS485.
**Range: 1…200**
**Def.:1**

**HP Baudrate seriale rete supervisione**
Imposta la velocità di linea nella rete di supervisione RS485.
**1=** 1200 Baud
**2=** 2400 Baud
**3=** 4800 Baud
**4=** 9600 Baud
**5=** 19200 Baud
**Range: 1…5 flags**
**Def.: 5**

**Hr Versione software**
Visualizza la versione software di µAC nel formato n.nn.

***HF Logic of the alarm relay (Out 6)***
*Selects the logic of the relay, normally energised or de-energised, and the category of alarms which activate this relay, see Tab. 5 on p. 35.*
***0=*** *Relay de-energised for all alarms*
***1=*** *Relay energised for all alarms*
***2=*** *Relay de-energised only for serious alarms*
***3=*** *Relay energised only for serious alarms*
***Range: 0to3 flags***
***Def.: 0***

***HG Delay on start-up***
*Sets the delay time on each switching from stand-by to ON or POWER-ON. During this phase the green LED is on but all actuators remain off.*
***Range: 0to300s***
***Def.:0***
***HH USER password***
*Sets the value of the user password to access the User parameters.*
***Range: 0to200***
***Def.:22***

***Hi Keypad lock***
*Prevents non-authorised personnel from modifying the parameters.*
***0=*** *no lock*
***1=*** *locks all parameter modification, alarm reset and hour counter functions (except for access to the user password and switching off via keypad); the lock symbol appears on the display.*
***Range: 0to1 flag***
***Def.:0***

***HL Parameter sets***
*Allows various configurations of parameter levels (see Tab. 2 of parameters at the start of chapter 6).*
***Range: 0to3 flags***
***Def.:0***

***Hn Select data shown on display***
*Selects which values are shown on the display, in normal conditions: temperature and humidity read by the probes or the set point, or, if the clock board is present, the current time.*

*In the latter two cases, pressing the button ⬇ shows the values read by the probes.*
***0=*** *Probes B1, B3 (if present)*
***1=*** *Temperature and humidity set points (if present)*
***2=*** *Day and time (if clock present)*
***Range: 0to2 flags***
***Def.: 0***

***Ho Supervisory network serial address***
*Sets the address of the device in the RS485 supervisory network.*
***Range: 1to200***
***Def.:1***

***HP Supervisory network serial baudrate***
*Sets the line speed in the RS485 supervisory network.*
***1=*** *1200 Baud*
***2=*** *2400 Baud*
***3=*** *4800 Baud*
***4=*** *9600 Baud*
***5=*** *19200 Baud*
***Range: 1to5 flags***
***Def.: 5***

***Hr Software version***
*Displays the software version of the µAC in the format n.nn.*

## 7. Orologio, fasce orarie e storico allarmi

**Funzioni abilitate solo con scheda orologio MAC2CLK000 installata.**

### 7.1 Orologio

**Visualizzazione ora**

Premendo il tasto viene visualizzata l'ora e la data corrente.
Una prima pressione visualizza sul display l'ora e il giorno della settimana (1= lunedì, 2= martedì, ..., 7= domenica); una pressione successiva mostra la data nel formato giorno-mese-anno.

**Impostazione ora**

Premere prima il tasto ⬆ (e non rilasciarlo) poi il tasto **Prg** e mantenerli premuti entrambi per 5 s.

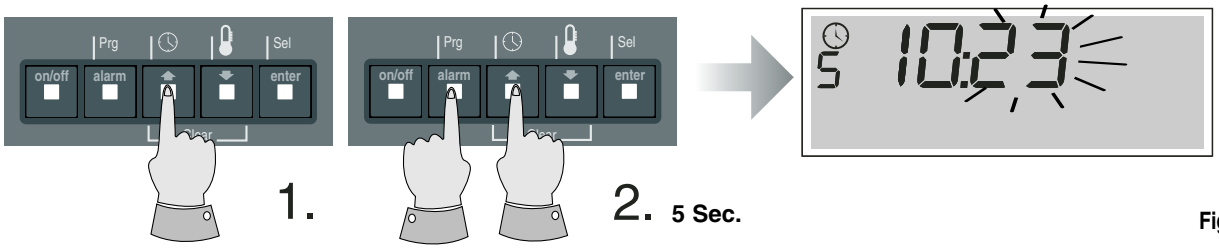



Fig. 32

L'indicazione dei minuti inizia a lampeggiare e con i tasti ⬆ e ⬇, si imposta l'ora desiderata.
Con il tasto **Sel**, invece, si selezionano, in sequenza, i campi: ore - giorno della settimana - anno - mese - giorno del mese.
Al termine, la pressione del tasto **Prg** conferma le modifiche apportate.

### 7.2 Fasce orarie

Entrati nel parametro **rt** (vedi Modifica parametri USER) è possibile selezionare **rt= 1 o 2** abilitando la funzione fasce orarie.
Una successiva pressione del tasto **Sel** visualizza in sequenza, con lo scorrimento di un segmento, le fasce orarie 1, 2, 3, 4 del giorno 1 (lunedì), ..... , le fasce orarie 1, 2, 3, 4 del giorno 7 (domenica).

I tasti ⬆ e ⬇ consentono, con step di 10 minuti, di modificare l'ora di inizio della fascia selezionata, mentre, il tasto **On/Off** abilita o disattiva l'azione della fascia stessa confermata con le scritte ON/OFFsul display.

**Copia delle fasce orarie**
Se gli orari impostati delle fasce sono validi anche per giorni successivi è sufficiente copiarli tenendo premuto il tasto **Sel** per 3 s.
Terminata la copia, automaticamente viene visualizzato il giorno successivo: se anche quest'ultimo deve essere copiato, rilasciare il tasto **Sel** e, quindi, premerlo nuovamente per 3 s.

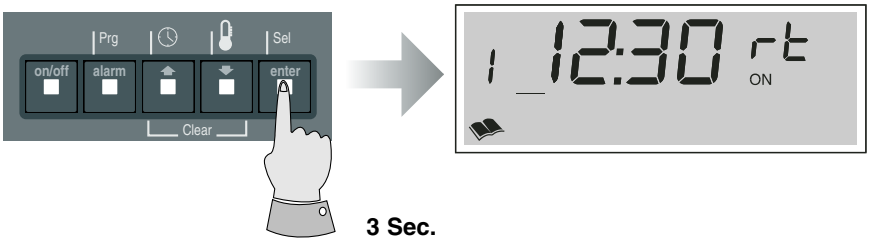



Fig. 33

Lo stato di funzionamento controllato da fasce orarie è indicato tramite il simbolo sul display.
**N.B. Lo stato di On da fasce orarie agisce solo se la macchina è attivata da tastiera e da ingresso remoto (se abilitato).**

Lo stato di Off da fasce orarie, visualizzato tramite il simbolo , "mezza luna" sul display, agisce in modo diverso, a seconda che il parametro **rt** valga 1 o 2:
**rt= 1, Sleep mode:** durante lo stato di Off il ventilatore, se controllato in modo proporzionale, funziona al minimo e gli attuatori rimangono spenti.

## *7. Clock, time bands and alarm log*

***Functions enabled only with the clock board MAC2CLK000 installed.***

### *7.1 Clock*

***Time display***

*Pressing the button displays the current time and date.*
*Pressing the button once displays the time and the day of the week (1= Monday, 2= Tuesday, ..., 7= Sunday); pressing it again displays the date in the format day-month-year.*

***Setting the time***

*First press the ⬆ button (keeping it pressed) and then the **Prg** button, keeping both pressed for 5 seconds.*

*The minutes will begin to flash; use the ⬆ and ⬇ buttons to set the desired time. Use the Sel button, on the other hand, to select, in order, the fields: hours - day of the week - year - month - day of the month. At the end, press the **Prg** button to confirm the modifications made.*

### *7.2 Time bands*

*Entering the parameter rt (see USER parameter modification) allows the selection of **rt= 1 or 2**, enabling the time band function. Pressing the **Sel** button displays, in sequence, with the scrolling of a segment, time bands 1, 2, 3, 4 of day 1 (Monday), ..... , time bands 1, 2, 3, 4 of day 7 (Sunday). The ⬆ and ⬇ buttons allow, with 10 minute steps, the start time of the selected band to be modified, while the **ON/OFF** button enables or disables the action of the band itself, confirmed by the messages ON/OFF on the display.*

***Copying the time bands***
*If the times set for the bands are also valid for the following days, these can be simply copied by pressing and holding the **Sel** button for 3 seconds. Once the copy has been made, the following day is automatically displayed: if this too is to be copied, release the **Sel** button and then press it again for a further 3 seconds.*

*The operating mode controlled by the time bands is indicated by the symbol on the display.*
***N.B. The ON status controlled by the time bands is only valid if the machine is first activated from the keypad or the remote input (if enabled).***
*The OFF status controlled by the time bands, displayed by the "half moon" symbol on the display, acts according to whether parameter **rt** is set to 1 or 2:*
***rt= 1, Sleep mode:** during the OFF status, the fan, if controlled proportionally, works at minimum and the actuators remain off.*

La macchina viene riaccesa nelle seguenti condizioni:

**a)** la temperatura supera del 70% le soglie di allarme di alta/bassa per ritornare in Sleep se la temperatura stessa rientra all'interno del 40% dei delta di allarme.

**b)** viene premuto il tasto **On/Off**: in questo caso lo stato di On dura fino al raggiungimento della successiva fascia oraria; durante tale periodo il simbolo "A" lampeggia.

**rt= 2:** la macchina viene posta in stand-by, come fosse stato premuto il tasto On/Off. Anche in questo caso la pressione del tasto **On/Off** attiva la macchina fino al successivo orario di commutazione in Off.

### 7.3 Storico allarmi

Al verificarsi di un allarme vengono memorizzati automaticamente: il codice dell'allarme, l'ora, il minuto e la data in cui si è verificato, fino ad un massimo di 300 segnalazioni. Al raggiungimento della dimensione massima vengono cancellati gli eventi più vecchi (Il codice 1 indica sempre l'allarme più recente).

**Visualizzazione storico allarmi**

Per visualizzare la lista degli allarmi memorizzati premere il tasto ⬆, seguito dal tasto **Alarm**.

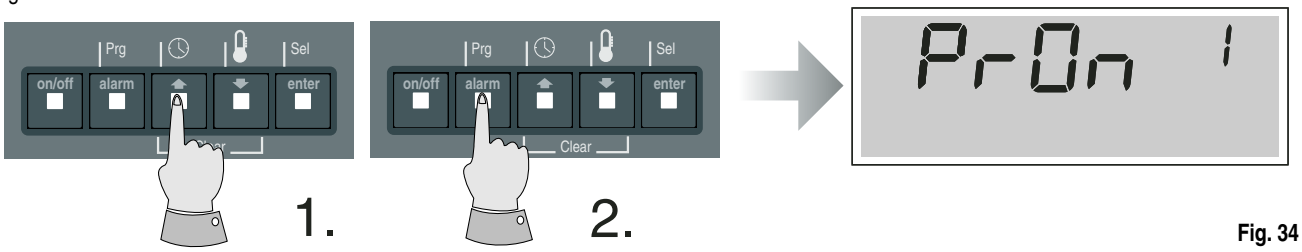



Fig. 34

Viene mostrato il codice dell'ultimo allarme verificatosi e, con successive pressioni di **Sel,** l'ora, il minuto e la data. Con ⬆ e ⬇ è possibile scorrerli. Visualizzando una posizione in cui non sia memorizzato alcun allarme, al posto del codice, verranno mostrati dei trattini.
La visualizzazione comprende un indice incrementale sul campo di destra, che individua la posizione corrente; l'indicazione della centinaia compare nel campo di sinistra (Es.: "1 rES 55 " , per indicare che si è effettuato un reset della macchina e la posizione è la 155).

Fig. 35

**Cancellazione storico allarmi**

All'interno della visualizzazione dello storico si può cancellare l'intero storico degli allarmi premendo **contemporaneamente** i tasti ⬆ e ⬇ per 5 s. A questo punto appare la richiesta di inserimento della password FACTORY (177) che, confermata con **enter**, comporta la cancellazione richiesta.

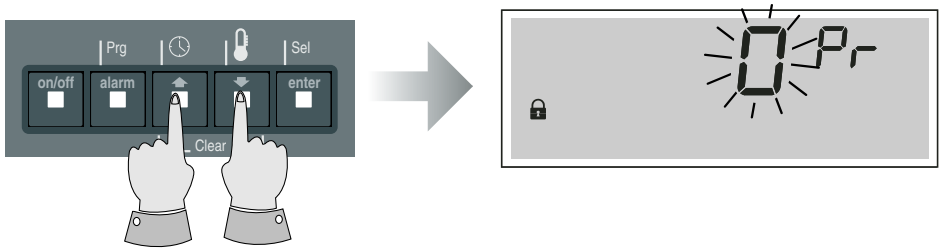



Fig. 36

Questa operazione reinizializza l'EEprom della scheda orologio ed è **obbligatoria** in fase di installazione della scheda stessa.
I codici di allarme visualizzati sono quelli riportati nella tabella del capitolo allarmi; vengono, inoltre, inseriti alcuni codici particolari per segnalare i seguenti eventi:

| Codice | Significato |
|---|---|
| **PrOn** | Accensione della macchina dopo mancanza alimentazione |
| **rES** | Reset manuale degli allarmi tramite tasto Alarm |

**Uscita dallo storico allarmi**

Per uscire dal menu storico allarmi premere il tasto Alarm.
L'uscita avviene, comunque, per time-out dopo 60 secondi.

*The machine is reactivated in the following conditions:*

***a)*** *the temperature exceeds 70% of the high/low alarm threshold, returning to Sleep if the temperature falls within 40% of the alarm delta.*

***b)*** *the ON/OFF is pressed: in this case the on status lasts until the next time band; during this period the symbol "A" flashes.*

***rt= 2:*** *the machine is in stand-by, as if the ON/OFF had been pressed. In this case too, pressing the **ON/OFF** button activates the machine until the next band switching OFF time.*

### *7.3 Alarm log*

*In the event of an alarm the alarm code, hour, minute and data are recorded, up to a maximum of 300 signals. On reaching the maximum number the oldest events are deleted (code 1 always indicates the most recent alarm).*

***Display alarm log***

*To display the list of alarms recorded, press the ⬆ button, followed by the **Alarm** button.*

*The code of the last alarm event is shown, and, on repeatedly pressing **Sel**, the hour, minute and the date. The ⬆ and ⬇ buttons scroll the alarm data. In places where no alarm has been recorded, dashes are displayed in the place of the code. The display includes an incremental index in the right-hand field, which identifies the current position; the hundreds then appear in the field on the left (e.g.: "1 rES 55" indicates that a reset of the machine was performed, and the position is 155).*

***Deleting the alarm log***

*The entire alarm log can be deleted from within the display of log itself, by pressing the ⬆ and ⬇ buttons together for 5 seconds.*
*At this point the FACTORY password (177) is required, which, confirmed by enter, leads to the deletion of the log.*

*This operation re-initialises the clock board EEPROM and must be performed when installing the board itself.*
*The alarm codes displayed are those reported in the table in the chapter on the alarms; in addition, other special codes have been included to signal the following events:*

| *Code* | *Meaning* |
|---|---|
| ***PrOn*** | *Machine re-start after power failure* |
| ***rES*** | *Manual alarm reset using the Alarm button* |

***Exiting the alarm log***

*To exit the alarm log menu, press the Alarm button.*
*The menu is exited in any case by time-out, after 60 seconds.*

## 8. Allarmi e segnalazioni

Al verificarsi di un allarme la macchina esegue le seguenti azioni:

- attiva il buzzer e visualizza , (se abilitato e macchina in On);
- attiva il relè d'allarme (secondo i parametri HF, HA);
- visualizza il codice d'allarme ed accende il relativo LED rosso.

In questa condizione la pressione del tasto **alarm** tacita il buzzer.
Con la scomparsa degli allarmi a ripristino automatico, se non sono attivi degli allarmi a ripristino manuale, si ha:

- spegnimento del buzzer;
- disattivazione del relè d'allarme, vedi parametro HF;
- spegnimento del LED rosso di allarme;
- riattivazione degli attuatori spenti a causa dell'allarme.

Con una pressione contemporanea dei tasti e , per 2 s, cessa la visualizzazione del codice degli allarmi.
In caso di allarmi a ripristino manuale, premendo contemporaneamente i tasti e , per 2 s, vengono effettuate le seguenti azioni:

- disattivazione del relè d'allarme, vedi parametro HF;
- spegnimento del LED rosso di allarme;
- riattivazione degli attuatori spenti a causa dell'allarme.

Le segnalazioni di manutenzione dei compressori 1 e/o 2, ventilatore e filtro per superamento soglie contaore provocano l'attivazione del simbolo , sul display del led rosso, del buzzer e del relè d'allarme.
I messaggi di allarme vengono mostrati ciclicamente con l'ordine progressivo indicato nella tabella seguente. Al termine riprende la visualizzazione della percentuale di umidità (se presente) per 6 s.

## *8. Alarms and signals*

*In the event of an alarm, the machine performs the following actions:*

- *activates the buzzer and display , (if enabled and machine ON);*
- *activates the alarm relay (according to parameters HF, HA);*
- *displays the alarm code and switches on the corresponding red LED.*

*In this condition, pressing the alarm button silences the buzzer.*
*The termination of alarms with automatic reset, if no alarms with manual reset are active, brings about:*

- *the switching off of the buzzer;*
- *the deactivation of the alarm relay, see parameter HF;*
- *the switching off of the red alarm LED;*
- *the re-activation of the actuators switched off by the alarm.*

*Pressing the and buttons together for 2 seconds cancels the display of the alarm codes.*

*In the event of alarms with manual reset, pressing the and buttons together for 2 seconds brings about:*

- *the deactivation of the alarm relay, see parameter HF;*
- *the switching off of the red alarm LED;*
- *the re-activation of the actuators switched off by the alarm.*

*The maintenance signals for compressors 1 and/or 2, the fan and the filter, due to the exceeding of the hour counter thresholds, activate the symbol on the display, the red LED, the buzzer and the alarm relay. The alarm messages are shown cyclically in the order indicated in the following table. On termination, the display of the percentage of humidity (if present) returns for 6 seconds.*

### 8.1 Tabella allarmi / *8.1 Table of alarms*

| n. | Cod. | Descrizione/*Description* | Delay | Reset | Buzz. | Alarm *Out6* | C1 *Out1* | C2 *Out2* | R1 *Out3* | R2 *Out4* | Sys/ON *Out5* | Fan *Y2* | Hum. *Y1* | Dehum *Out7* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E1 | sonda B1 / *probe B1* | 1 min | P5 | ON | ON ⚠ | OFF | OFF | OFF | OFF | —— | —— | OFF | OFF |
| 2 | E2 | sonda B2 / *probe B2* | 1 min | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 3 | E3 | sonda B3 / *probe B3* | 1 min | P5 | ON | ON | —— | —— | —— | —— | —— | —— | OFF | OFF |
| 4 | E4 | sonda B4 / *probe B4* | 1 min | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 5 | Er: E | EEPROM boot | imed. | auto | —- | —- | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 6 | EE | EEPROM run | imed. | auto | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 7 | EL | rete insuff. / *insuff. power* | imed. | auto | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 8 | H1 | alta press C1 / *high press C1* | imed. | man | ON | ON ⚠ | OFF | —— | —— | —— | —— | —— | —— | —— |
| 9 | H2 | alta press C2 / *high press C2* | imed. | man | ON | ON ⚠ | —— | OFF | —— | —— | —— | —— | —— | —— |
| 10 | L1 | bassa press C1 / *low press C1* | P3 | P5 | ON | ON ⚠ | OFF | —— | —— | —— | —— | —— | —— | —— |
| 11 | L2 | bassa press C2 / *low press C2* | P3 | P5 | ON | ON ⚠ | —— | OFF | —— | —— | —— | —— | —— | —— |
| 12 | F1 | filtro sporco / *filter dirty* | imed. | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 13 | FL | flusso / *flow* | P1/2 | P5 | ON | ON ⚠ | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 14 | FA | fumo-fuoco / *smoke-fire* | imed. | P5 | ON | ON ⚠ | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 15 | CF | flusso acqua / *water flow* | imed. | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 16 | r1 | resistenze / *heating elements* | imed. | man | ON | ON | —— | —— | OFF | OFF | —— | —— | —— | —— |
| 17 | At | temp mandata / *supply temp* | 2min | P5 | ON | ON ⚠ | OFF | OFF | —— | —— | —— | —— | —— | —— |
| 18 | AH | umidificatore / *humidifier* | 30 s | P5 | ON | ON | —— | —— | —— | —— | —— | —— | OFF | —— |
| 19 | Lt | bassa temper. / *low temp.* | PA | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 20 | Ht | alta temper. / *high temp.* | PA | P5 | ON | ON ⚠ | ON | ON | —— | —— | —— | —— | —— | —— |
| 21 | ht | preallarme alta temperatura *high tempeature prealarm* | PA | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 22 | LH | bassa humid. / *low humid.* | PA | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 23 | HH | alta humid. / *high humid.* | PA | P5 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 24 | tC | termico comp. / *comp. thermal* | imed. | P5 | ON | ON ⚠ | OFF | —— | —— | —— | —— | —— | —— | —— |
| 25 | tF | termico fan / *fan thermal* | imed. | P5 | ON | ON ⚠ | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 26* | t1 / t2 | termico fan 1-2 / *fan 1-2 thermal* | imed. | P5 | ON | ON | —— | —— | —— | —— | OFF(1) | —— | —— | OFF(2) |
| 28 | AL | generico grave / *serious generic* | PC | Pb | ON | ON ⚠ | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 29 | PA | mancanza rete / *power fail* | 2 s | auto | ON | ON ⚠ | OFF | —— | OFF | —— | —— | —— | ——- | —— |
| 30 | CL | orologio / *clock* | imed./*imm.* | man | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 31 | n1+ | contaore comp.1 / *counter comp.1* | imed./*imm.* | c9 | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 32 | n2+ | contaore comp.2 / *counter comp.2* | imed./*imm.* | cA | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 33 | nF+ | contaore filtri / *counter filter* | imed./*imm.* | FC | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |
| 34 | nn+ | contaore vent. / *counter fan* | imed./*imm.* | FA | ON | ON | —— | —— | —— | —— | —— | —— | —— | —— |

⚠ = **allarmi gravi:** nella configurazione con due relè di allarme attivano l'uscita di allarme; gli altri allarmi, invece, attivano il relè di deumidifica. Nella configurazione con più unità in rotazione gli allarmi gravi provocano l'apertura del relè e, quindi, l'attivazione dell'unità in stand-by.

⚠ = ***serious alarms:*** *in the configuration with two alarm relays, these activate the alarm output; the other alarms, ON the other hand, activate the dehumidification relay. In the configuration with a series of units in rotation, serious alarms cause the opening of the relay and, then, the placement of the unit in stand-by.*

**Tab. 5**

## 8.2 Segnalazioni di allarme

**Tutti gli allarmi, tranne quello esterno generico (AL), configurabile tramite il parametro Pb, e quello orologio, sono rilevati solo con macchina in On.**

**E1: sonda temperatura ambiente guasta:** generato per sonda aperta o in cortocicuito. Allarme ritardato di 1 minuto a partire dall'istante in cui la macchina viene posta in On e da quando viene rilevato l'errore. Al momento in cui viene rilevato il controllo viene posto in Off rispettando le tempistiche configurate tranne il ventilatore.

**E2: sonda aria esterna guasta:** viene generato per sonda aperta o in cortocicuito. Allarme ritardato di 1 minuto a partire dall'istante in cui la macchina viene posta in On e da quando viene rilevato l'errore.
Al momento in cui viene rilevato vengono disattivate le funzioni ad essa relative: compensazione e freecooling.
Se la sonda B2 è utilizzata per la condensazione, il ventilatore viene forzato alla massima velocità.

**E3: sonda umidità / pressione:** viene generato per sonda aperta e per tensioni superiori a 1,15 V, se l'ingresso è configurato come 0…1 V, oppure, se l'ingresso è configurato come 4…20mA, per correnti inferiori a 3 mA e superiori a 23 mA.
Allarme ritardato di 1 minuto a partire dall'istante in cui la macchina viene posta in On e da quando viene rilevato l'errore.
Al momento in cui viene rilevato vengono disattivate le funzioni associate:
- regolazione dell'umidità (umidifica, deumidifica);
- se la sonda B3 viene usata come sensore di pressione, per il controllo della condensazione, ed è presente la sonda B2, per lettura temperatura aria esterna, il ventilatore viene forzato alla massima velocità se la temperatura rilevata da B2>15°C. Stessa azione anche nel caso di assenza della sonda B2.
- Se la temperatura B2≤15°C, invece, il ventilatore gira al 50% della velocità.

**E4: sonda temperatura aria mandata:** viene generato per sonda aperta o in cortocicuito.
Allarme ritardato di 1 minuto a partire dall'istante in cui la macchina viene posta in On e da quando viene rilevato l'errore.
Al momento in cui viene rilevato vengono disattivate le funzioni ad essa relative: gestione allarme At temperatura mandata e, se attivo il free-cooling con controllo della temperatura di mandata, viene chiusa la serranda.

**EE: errore lettura/scrittura dati da EEPROM.**
Può verificarsi anche al reset solo se non è possibile effettuate la correzione del banco secondario. Questo errore non influenza il funzionamento del regolatore.

**EL: alimentazione insufficiente in scrittura eeprom**
Errore di scrittura dati su EEPROM dovuto a mancanza di alimentazione o tensione di alimentazione inferiore a 13 Veff.

**H1-H2: alta pressione C1-C2**
Viene rilevato indipendentemente dall'accensione del compressore e provoca lo spegnimento immediato dello stesso senza rispettare le tempistiche relative. L'allarme H2 viene gestito solo se il parametro H5= 2 o 4 (due circuiti indipendenti).
Se presente la regolazione dei ventilatori di condensazione, questi si attivano per 60 s alla massima velocità prima di spegnersi.

**L1-L2: bassa pressione C1-C2**
Viene rilevato solo con compressore acceso e provoca lo spegnimento immediato dello stesso senza rispettare le tempistiche relative.
L'allarme è ritardato di P3 secondi dalla partenza del compressore stesso.
Se impostato il ripristino automatico, parametro P5, la riaccensione del compressore viene tentata per 10 volte, poi l'allarme diventa a ripristino automatico.
L'allarme L2 viene gestito solo se il parametro H5= 2 o 4 (due circuiti indipendenti).

## *8.2 Alarm signals*

***All the alarms, except for the generic external alarm (AL), configured by parameter Pb, and the clock, are detected only when the machine is ON.***

***E1: ambient temperature probe failure:*** *generated due to open or short-circuited probe. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected. At the moment of detection the control is placed OFF, respecting the configured times, except for the fan.*

***E2: external air probe failure:*** *generated due to open or short-circuited probe. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected. At the moment of detection the corresponding functions -compensation and free cooling are deactivated. If probe B2 is used for condensation, the fan is forced on at maximum speed.*

***E3: humidity / pressure probe failure:*** *generated due to open probe and for voltages above 1.15V, if the input is configured as 0to1V, or, if the input is configured as 4to20mA, for currents below 3mA and over 23mA. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected.*
*At the moment of detection the corresponding functions are deactivated:*
- *humidity control (humidification, dehumidification);*
- *if probe B3 is used as a pressure sensor, for the control of condensation, and probe B2 is present for reading the external air temperature, the fan is forced on at maximum speed if the temperature measured by B2>15°C. The same is true if probe B2 is not present.*
- *If the temperature B2≤15°C, on the other hand, the fan operates at half speed.*

***E4: supply air temperature probe:*** *generated due to open or short-circuited probe.*
*Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected. At the moment of detection the corresponding functions are deactivated: supply temperature alarm management (At), and, if free-cooling is active with control of the supply temperature, the damper is closed.*

***EE: EEPROM data read/write error.***
*Can occur also during a reset only if it is not possible to make the correction to the secondary bank. This error does not affect the operation of the regulator.*

***EL: insufficient power supply during EEPROM write***
*Data write error to EEPROM due to power failure or power below 13Veff.*

***H1-H2: high pressure C1-C2***
*Detected irrespective of the activation of the compressor, and causes its immediate switching off without waiting the corresponding delay times. The alarm H2 is managed only if parameter H5= 2 or 4 (two independent circuits).*
*If condensation fan regulation is present, this is activated for 60 seconds at maximum speed before switching off.*

***L1-L2: low pressure C1-C2***
*Detected only with the compressor on, and causes its immediate switching off without waiting the corresponding delay times. The alarm is delayed by P3 seconds on the start-up of the compressor. If automatic reset is set, parameter P5, a compressor restart is attempted 10 times, then the alarm is automatic reset automatically.*
*The alarm L2 is managed only if parameter H5= 2 or 4 (two independent circuits).*

**F1: filtro sporco**
Allarme di sola segnalazione, non comporta alcuna disattivazione delle uscite.

**FL: allarme flusso aria**
Allarme ritardato tramite i parametri P1 e P2.
L'intervento provoca lo spegnimento di tutti di dispositivi senza rispettare le tempistiche dei compressori e del ventilatore.
Se impostato il ripristino automatico, parametro P5, la riaccensione delle uscite viene tentata per 10 volte.

**FA: allarme fumo-fuoco**
Allarme configurabile tramite il parametro PE=1.
Se configurato provoca lo spegnimento di tutti gli attuatori senza rispettare le tempistiche.
Tale allarme viene rilevato anche con la macchina in stand-by.

**CF: flusso acqua**
Allarme configurabile, solo per macchine CW, tramite il parametro PF=1.
Il verificarsi di tale allarme provoca la chiusura della valvola del freddo.

**r1: allarme termico resistenze**
Provoca lo spegnimento immediato delle resistenze.

**At: allarme alta temperatura mandata (funzione cooling)**
Viene abilitato dalla presenza della sonda B4 (parametro /2) temperatura aria mandata e dal set impostato sul parametro Pd.
L'allarme ha un ritardo fisso di 2 minuti ed interviene solo se gli attuatori del freddo sono accesi e quelli del caldo spenti.
In particolare le condizioni di attivazione dell'allarme sono:

- **ED:** almeno un compressore acceso e resistenze spente o valvola caldo chiusa;
- **CW:** valvola freddo aperta più del 50% e valvola caldo chiusa o resistenze spente.

Tale allarme, quando rilevato, provoca l'ingresso in stato di blocco del solo compressore in quel momento acceso, il secondo compressore rimane abilitato.

**AH: allarme umidificatore**
Allarme ritardato di 30 secondi. Se viene rilevato viene disattivata l'uscita umidificatore (0…10Vdc o a relè).

**Lt: allarme bassa temperatura**
**Ht: allarme alta temperatura**
Tali allarmi sono ritardati dall'accensione del regolatore (o dall'uscita dallo stand-by) per un tempo pari al parametro PA e di 1 minuto dal superamento della soglia.
Il ripristino avviene, se programmato come automatico, 1 grado al di sopra (Lt) e 1 grado al di sotto (Ht) della soglia stessa.
Inoltre, il superamento della soglia di alta provoca l'accensione immediata dei compressori senza rispettare le tempistiche relative.

**ht: preallarme alta temperatura**
Allarme configurabile tramite il parametro PG=1.
Tali allarme è ritardato dall'accensione del regolatore (o dall'uscita dallo stand-by) per un tempo pari al parametro PA e di 1 minuto dal superamento della soglia.
Il ripristino avviene, se programmato come automatico, 1 grado al di sotto della soglia P7/2.

**LH-HH: allarme bassa-alta umidità**
Allarmi ritardati dall'accensione (o dall'uscita dallo stand-by) per un tempo pari al parametro PA e di 1 minuto dal superamento della soglia impostata. Sono allarmi di sola segnalazione e le isteresi sono di 1% U.R.

**tC: allarme termico compressore**
Allarme immediato, provoca lo spegnimento istantaneo del compressore. Viene gestito solo se il parametro H5= 1 o 5 (un solo compressore o due compressori in tandem).

***F1: dirty filter***
*Signal-only alarm. No outputs are deactivated.*

***FL: air flow alarm***
*Alarm delayed by parameters P1 and P2.*
*The activation of this alarm causes the switching off of all of devices without waiting the delay times of the compressors and the fan.*
*If set for automatic reset, parameter P5, a restart of the outputs is attempted 10 times.*

***FA: smoke-fire alarm***
*This alarm can be configured using the PE=1 parameter.*
*If configured, it causes the shutdown of all the actuators without respecting the timings.*
*This alarm is noted with the machine in stand-by too.*

***CF: water flow***
*This alarm can be configured, only for CW machines, using the PF=1 parameter.*
*When this alarm occurs, it causes the closing of the cooling valve.*

***r1: heating element thermal overload alarm***
*Causes the immediate switching off of the heating elements.*

***At: high supply temperature alarm (cooling function)***
*Enabled by the presence of the supply air temperature probe B4 (parameter /2) and by the setting of parameter Pd. The alarm has a fixed delay of 2 minutes, and is activated only if the cooling actuators are on and heating actuators are off.*
*In particular, the conditions leading to the activation of the alarm are:*

- ***ED:*** *at least one compressor on and heating elements off or heating valve closed;*
- ***CW:*** *cooling valve open more than 50% and heating valve closed or heating elements off.*

*This alarm, when detected, only blocks the compressor on at that moment, while the second compressor remains enabled.*

***AH: humidifier alarm***
*Alarm delayed by 30 seconds. If detected, the humidifier output (0to10Vdc or relay) is deactivated.*

***Lt: low temperature alarm***
***Ht: high temperature alarm***
*These alarms are delayed on the start-up of the regulator (or on exiting stand-by mode) for a period equal to parameter PA, and for 1 minute on exceeding the set threshold. The reset occurs, if programmed as automatic, 1 degree above (Lt) and 1 degree below (Ht) the threshold. In addition, exceeding the high temperature threshold causes the immediate start-up of the compressors without waiting the corresponding delay times.*

***ht: high temperature prealarm***
*This alarm can be configured using the PG=1 parameter.*
*This alarm is delayed by the startup of the regulator (or by going out of the stand-by) for a time equal to the parameter PA and of 1 minute from the overcoming of the threshold.*
*If programmed as automatic, the reset occurs 1 degree below the P7/2 threshold.*

***LH-HH: low-high humidity alarm***
*These alarms are delayed on start-up (or on exiting stand-by mode) for a period equal to parameter PA, and for 1 minute from exceeding the set threshold. These are signal-only alarms, with an hysteresis of 1% R.H.*

***tC: compressor thermal overload alarm***
*Immediate alarm, causes the instant switching off of the compressor. This is managed only if parameter H5= 1 or 5 (one compressor only or two compressors in tandem).*

**tF: allarme termico ventilatore**
Allarme immediato, provoca lo spegnimento istantaneo di tutti i dispositivi senza rispettare le tempistiche dei compressori.
Viene gestito solo se il parametro H5= 1 o 5 (un solo compressore o due compressori in tandem).

**t1 / t2: termico fan 1-2**
Allarme configurabile tramite il parametro HA=6 o 7.
Allarme immediato, provoca lo spegnimento istantaneo dell'uscita relativa:
- **t1=** ventilatore di mandata 1 (ID2)
- **t2=** ventilatore di mandata 2 (ID4)

Se entrambi sono attivi viene forzato anche l'allarme di flusso (FL) che spegnerà tutte le uscite (vedi descrizione FL).

**AL: allarme generico esterno**
Allarme configurabile tramite i parametri Pb e PC.
Se configurato come allarme grave spegne tutti gli attuatori senza rispettare le tempistiche.

**PA: allarme mancanza alimentazione shelter**
Allarme esterno di assenza alimentazione ritardato di 2 s.
Viene generato se il modello configurato è shelter e l'ingresso ID6 è aperto, esso provoca lo spegnimento immediato di compressore e resistenza, mentre da il consenso all'apertura della serranda. Ed è prioritario rispetto all'inibizione dovuta ad una richiesta di deumidifica.

**CL: allarme orologio guasto**
Allarme generato dal malfunzionamento della scheda orologio. Provoca l'interruzione della funzione fasce orarie e il regolatore entra nello stato di On anche se comandato in spegnimento dalla fascia corrente.
Tale evento non blocca la funzione storico allarmi, la quale continua a registrare le segnalazioni ma con valori temporali non corretti.

**n1: avviso manutenzione compressore 1**
**n2: avviso manutenzione compressore 2**
Allarme di sola segnalazione causato dal superamento della soglia contaore, visualizzato insieme al simbolo , vedi parametri c9 (compressore 1) e cA (compressore 2).

**nF: avviso manutenzione filtri**
**nU: avviso manutenzione ventilatore**
Allarme di sola segnalazione causato dal superamento della soglia contaore, visualizzato insieme al simbolo , vedi parametri FC (filtri) ed FA (ventilatore).

***tF: fan thermal overload alarm***
*Immediate alarm, causes the instant switching off of all devices without respecting the compressor delay times.*
*This is managed only if parameter H5= 1 or 5 (one compressor only or two compressors in tandem).*

***t1 / t2: fan 1-2 thermal***
*This alarm can be configured using the HA=6 or 7 parameter. Immediate alarm, it causes the instantaneous shutdown of the connected output:*
- ***t1=** 1 (ID2) supply fan*
- ***t2=** 2 (ID2) supply fan*

*If both of them are ON the flow alarm is forced too turning OFF all the outputs (see description FL).*

***AL: generic external alarm***
*This alarm can be configured by setting parameters Pb and PC.*
*If configured as a serious alarm, it switches off all actuators without respecting the delay times.*

***PA: shelter power failure alarm***
*External power failure alarm delayed by 2 seconds.*
*This is generated for models configured as shelters when input ID6 is open; it causes the immediate switching off of the compressor and the heating element, and allows the opening of the damper. It is a priority alarm in respect of the inhibition due to a dehumidification request.*

***CL: clock failure alarm***
*Alarm generated by the malfunctioning of the clock board. Interrupts the time band function, and the regulator goes into ON status if even the current band provides an off command. This event does not block the alarm log, which continues to store the signals, however with incorrect time values.*

***n1: compressor 1 maintenance warning***
***n2: compressor 2 maintenance warning***
*Signal-only alarm generated when the hour counter threshold has been exceeded, displayed together with the  symbol, see parameters c9 (compressor 1) and cA (compressor 2).*

***nF: filter maintenance warning***
***nU: fan maintenance warning***
*n2: compressor 2 maintenance warning*
*Signal-only alarm generated when the hour counter threshold has been exceeded, displayed together with the  symbol, see parameters FC (filters) and FA (fan).*

## 8.3 Segnalazioni di arresto critico

Appaiono a causa di malfunzionamenti interni della macchina e ne provocano l'arresto.
Il codice viene visualizzato sul campo della temperatura ambiente (o ora minuti) del display Lcd.

**Er: C** Errore di checksum durante la verifica del codice in Flash: il controllo non è più utilizzabile.

**Er: E** Il contenuto della EEPROM (memoria parametri) si è danneggiato.
È possibile tentare un ripristino ricaricando i valori di default.

**Er: L** Tensione di alimentazione insufficiente: Tens. alim. < 13 Veff durante la scrittura dei valori di default o durante il tentativo automatico di ripristinare un blocco di EEPROM danneggiato.

## *8.3 Machine shut-down signals*

*These appear in the event of internal machine malfunctions and cause its shut-down.*
*The code is displayed in the ambient temperature (or hour-minutes) field of the LCD display.*

***Er: C*** *Checksum error during code check in Flash: the control can no longer be used.*

***Er: E*** *The content of the EEPROM (parameter memory) is damaged.*
*A reset can be attempted by reloading the default values.*

***Er: L*** *Insufficient power: Power voltage < 13Veff when writing the default values or during an attempt to automatically recovery an EEPROM damaged sector.*

## 9. Schede opzionali

µAC è predisposto per l'utilizzo di schede opzionali, a seconda dell'utilizzo.

- **scheda seriale RS485:** il µAC può essere inserito in una rete di supervisione o teleassistenza;
- **scheda MCHRTF*0A0:** il regolatore controlla la velocità del ventilatore in modo proporzionale.
- **scheda orologio:** vengono abilitate le funzioni orologio, fasce orarie e storico allarmi;
- **chiave di programmazione:** permette di salvare e/o copiare la lista dei parametri impostati per copiarli su altri strumenti in modo veloce ed affidabile.

### 9.1 Scheda seriale RS485

Per poter utilizzare il µAC in una rete di supervisione o teleassistenza RS485 è necessario inserire la scheda opzionale RS 485, seguendo la procedura:

- disalimentare il µAC;
- inserire la scheda RS485 sul connettore predisposto sulla scheda I/O (vedi fig. 5);
- effettuare il collegamento della linea seriale, rispettando le polarità indicate;
- alimentare il µAC.

**N. B.** LA linea seriale va chiusa con una resistenza da 120 ohm - 1/4 W, posta tra i morsetti Tx/Rx della scheda RS485 del µAC all'estremità opposta della rete, rispetto il supervisore.

**Set up**

Impostare l'indirizzo in rete del µAC tramite il parametro Ho e la velocità tramite il parametro HP dove:

| HP | Velocità |
|---|---|
| 1 | 1200 |
| 2 | 2400 |
| 3 | 4800 |
| 4 | 9600 |
| 5 | 19200 |

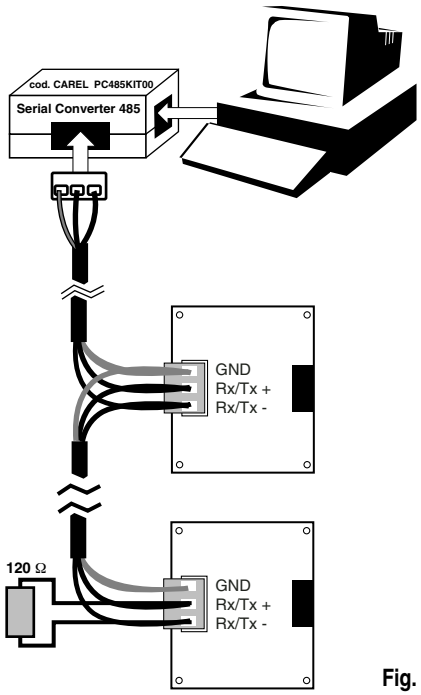



Fig. 37

**Caratteristiche tecniche scheda seriale RS485**
**Tensione di alimentazione:** dal µAC tramite connettore plug-in
**Corrente assorbita:** 20 mA
**Condizioni di immagazz.:** -10…70°C, U.R. < 80% non condensante
**Condizioni di funzionamento:** 0…65 °C, U.R. < 80% non condensante
**Dimensioni scheda:** 46x44 mm
**Grado di protezione:** IP00
**Inquinamento ambientale:** normale
**Limiti temperatura delle superfici:** come temp. di funzionamento
**Classificazione secondo la protezione contro le scosse elettriche:** da incorporare in apparecchiature di Classe I o II
**Categoria di resistenza al calore e al fuoco:** D
**PTI dei materiali di isolamento:** 250V
**Uscita seriale:** connettore morsetto a vite a 3 vie per fili con sezione min. di 0,2 mm² e sezione max di 1,5 mm²
**Standard:** RS485 asincrona optoisolata
**Velocità massima:** 19200 baud
**Numero massimo di dispositivi:** 200
**Distanza massima dal supervisore:** 1 km
**Cavo da utilizzare:** 1 coppia intrecciata e scherm. AWG20/22 con capacità tra i conduttori < di 90pF/m
(esempio i cavi BELDEN 8761-8762)
**Protezione contro le scosse elettriche:**
il dispositivo garantisce solo un isolamento funzionale tra la sorgente di alimentazione del µAC e la linea seriale, pertanto il trasformatore di alimentazione del µAC deve essere di sicurezza.

## *9. Optional boards*

*The µAC is designed for the application of optional boards, depending on requirements.*

- ***RS485 serial board:** the µAC can be included in a supervisory or telemaintenance network;*
- ***MCHRTF*0A0 board:** the regulator controls the speed of the fan pro portionally.*
- ***clock board:** enables the clock functions, time bands and alarm log;*
- ***programming key:** allows the list of set parameters to be saved and/or copied to other instruments in a quick and reliable manner.*

### *9.1 RS485 serial board*

*In order to use the µAC in an RS485 supervisory or telemaintenance network, the optional RS485 board must be inserted, as follows:*

- *disconnect power from the µAC;*
- *insert the RS485 board in the relative connector on the I/O board (see Fig. 5);*
- *connect the serial line, according to the polarity indicated;*
- *reconnect power to the µAC.*

***N.B.** The serial line should be terminated with a 120 ohm - 1/4W resistor, between the Tx/Rx terminals of the RS485 board on the µAC at the opposite end of network from the supervisor.*

***Set up***

*Set the network address of the µAC using parameter Ho, and the speed using parameter HP, where:*

| *HP* | *Speed* |
|---|---|
| *1* | *1200* |
| *2* | *2400* |
| *3* | *4800* |
| *4* | *9600* |
| *5* | *19200* |

***RS485 serial board technical specifications***
***Power supply:** from the µAC using plug-in connector*
***Current consumption:** 20mA*
***Storage conditions.:** -10to70°C, R.H. < 80% non-condensing*
***Operating conditions:** 0to65°C, R.H. < 80% non-condensing*
***Dimensions:** 46x44 mm*
***Index of protection:** IP00*
***Environmental pollution:** normal*
***Surface temperature limits:** as for operating temperatures*
***Classification according to protection against electric shock:** to be integrated in Class I or II devices*
***Category of resistance to heat and fire:** D*
***PTI of materials used for insulation:** 250V*
***Serial output:** 3-way screw terminal connector for leads with min. cross-section of 0.2 mm² and max. cross-section of 1.5 mm²*
***Standard:** optically-isolated asynchronous RS485*
***Maximum speed:** 19200 baud*
***Maximum number of devices:** 200*
***Maximum distance from supervisor:** 1 km*
***Cables:** 1 twisted pair and shield, AWG20/22 with capacity between leads < 90pF/m (e.g. BELDEN 8761-8762 cables)*
***Protection against electric shock:** the device guarantees only a functional insulation between the source power supply of the µAC and the serial line, thus the µAC must power supply must feature a safety transformer.*

### 9.2 Schede gestione velocità ventilatori

L'uscita analogica Y2 /GND non può gestire direttamente i ventilatori di condensazione.
Tale funzione è ottenuta utilizzando dei moduli opzionali esterni.
E' possibile pilotare il ventilatore in modalità taglio di fase (schede MCHRTF**A0) oppure avere un'uscita analogica 0…10 Vdc o 4…20 mA tramite il modulo CONV0/10A0.

**Calcolo velocità minima e massima dei ventilatori**
Utilizzando la regolazione proporzionale della velocità del ventilatore, tramite le schede di potenza MCHRTF**A0, devono essere individuati i corretti valori dei parametri F2 e F3, cioé soglia di tensione minima e massima triac.

- impostare i parametri **F1= 0** (ventilatore sempre acceso in modo indipendente dalle funzioni di regolazione) **F2 e F3= 0**.
- incrementare **F3** fino a quando il ventilatore gira ad una velocità ritenuta sufficiente (assicurandosi, dopo averlo fermato, che esso riprenda a girare, qualora lasciato libero);
- copiare il nuovo valore **F3** in **F2**, impostando così il valore di tensione minima;
- collegare un voltmetro tra i due morsetti "L" del modulo MCHRTF**A0 (vedi Fig. a fianco);
- incrementare **F3** fino a che la tensione letta dal voltmetro si stabilizza a circa a 4,6 Vac. Una volta trovato tale valore si noterà che anche incrementando **F3** la tensione non diminuirà più. Non aumentare ulteriormente **F3** per evitare danni al motore
- a questo punto, impostare **F1** al valore desiderato (1 o 2), l'operazione è conclusa.

**IMPORTANTE: L'alimentazione del µAC (G e G0) e della scheda MCHRTF**A0 devono essere in fase. Nel caso, ad esempio, l'alimentazione del sistema µAC sia trifase assicurarsi che il primario del trasformatore di alimentazione della scheda µAC sia allacciato alla stessa fase collegata ai morsetti N e L della scheda di regolazione di velocità; non utilizzare quindi trasformatori 380 Vac/24 Vac per l'alimentazione del controllo qualora si utilizzino fase e neutro per alimentare direttamente le schede di regolazione velocità.**
**Collegare il morsetto di terra del modulo MCHRTF**A0 (ove previsto) alla terra del quadro elettrico.**

### *9.2 Fan speed management board*

*The analogue output Y2 /GND can not directly manage the condensation fans.*
*This function is achieved using the optional external modules.*
*The fan can be managed in phase-cut mode (MCHRTF**A0 boards) or have a 0to10Vdc or 4to20mA analogue output, using the module CONV0/10A0.*

***Calculating the minimum and maximum speed of the fans***
*Using the proportional fan speed regulator fan, via the MCHRTF**A0 power boards, the correct values must be identified for parameters F2 and F3, that is the minimum and maximum triac voltage threshold.*

- *set parameters F1= 0 (fan always on irrespective of the regulation function) F2 and F3= 0.*
- *increase F3 until the fan operates at a sufficient speed (ensuring, when stopped, that it is free to turn unimpeded);*
- *copy the new F3 value to F2, thus setting the minimum voltage value;*
- *connect a voltmeter to the two "L" terminals on the MCHRTF**A0 module (see Fig. alongside);*
- *increase F3 until the voltage read by the voltmeter stabilises at around 4.6Vac. Once this value has been established it can be noted that even on increasing F3 the voltage no longer decreases. Do not increase F3 any further to avoid damaging the motor*
- *at this stage, set F1 to the desired value (1 or 2), and the operation is concluded.*

***IMPORTANT: The power supply to the µAC (G and G0) and the MCHRTF**A0 board must be in phase. In the event where, for example, the power supply to the µAC system is three-phase, ensure that the primary of the power supply transformer to the µAC board is connected to the same phase connected to terminals N and L on the speed regulation board; as a result, do not use 380Vac/24Vac transformers for the power supply to the control if phase and neutral are used to directly power the speed regulation board. Connect the ground terminal of the MCHRTF**A0 module (where present) to the ground of the electrical panel.***

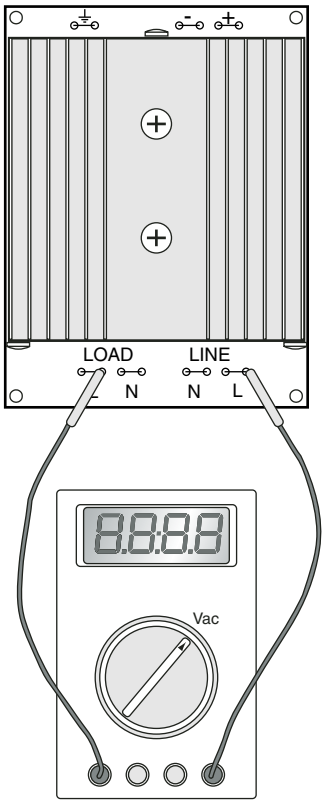



**Fig. 38**

### 9.3 Scheda orologio

Per abilitare la funzione orologio, fasce orarie e storico allarmi, è necessario inserire la scheda MAC2CLK000 e seguire la seguente procedura:
- togliere l'alimentazione al µAC;
- inserire la MAC2CLK000 sulla scheda I/O (vedi fig. 5);
- alimentare il regolatore;
- impostare data e ora ed effettuare la cancellazione dello storico allarmi (vedi paragrafo 7.3)

### *9.3 Clock board*

*To enable the clock, time band and alarm log functions, insert the MAC2CLK000 board and perform the following procedure:*
- *disconnect power from the µAC;*
- *insert the MAC2CLK000 on the I/O board (see Fig. 5);*
- *reconnect power to the regulator;*
- *set the date and time and delete the alarm log (see paragraph 7.3)*

## 10. Caratteristiche tecniche

| Caratteristiche tecniche | |
|---|---|
| **Alimentazione:** | 24 Vac ±15%  50/60 Hz |
| **Corrente massima assorbita:** | 200 mA con fusibile interno da 800 mA T (ritardato) |
| **Potenza trasformatore per µAC e ingressi digitali:** | 10 VA |
| **Campo utilizzo:** | Sonde temperatura -30…70 °C<br>Sonda umidità 0…100% U.R. |
| **Precisione misura (esclusa sonda):** | ±0,5 °C sonde NTC / ±0,005 V  0.5% f.s.  sonda 0…1 Vdc / ±0,02 mA  1% f.s.  sonda 4…20 mA |
| **Risoluzione:** | 0,1 °C |
| **Condizioni di funzionamento:** | -10T54 (-10…54 °C) con umidità 20…80% U.R. non condensante |
| **Condizioni di immagazzinameto:** | -10T70 (-10…70 °C) con umidità 0…80% U.R. non condensante |
| **Ingressi analogici:** | **B1-B2-B4**, 3 sonde NTC CAREL (10KΩ a 25°C) per temperatura<br>**B3**, 1 ingresso 0…1 Vdc/4…20 mA per sonda umidità o pressione (selezione tramite pin strip sul retro)<br>**+V**, Uscita alimentazione sonda 14Vdc 30mA max |
| **Ingressi digitali:** | **ID1-ID10**, 10 ingressi non optoisolati riferiti al potenziale di alimentazione G0 alimentati a 24Vac corrente assorbita da ogni ingresso 6,5 mA a 24Vac.<br>Gli allarmi sono attivi quando il relativo ingresso risulta aperto (non alimentato).<br>L'ingresso ID1, per On/Off remoto, accende la macchina quando è alimentato.<br>L'ingresso ID7, per Estate/Inverno, abilita il funzionamento invernale, quando è alimentato. |
| **Uscite analogiche:** | **Y1**, uscita 0…10 Vdc non optoisolata riferita al potenziale di alimentaz. G0 carico massimo 10 mA (1KΩ)<br>**Y2**, 1 uscita a taglio di fase per regolatori CAREL MCHRTF*0A0 impulsiva a frequenza di rete configurabile da parametri utente a modulazione di larghezza di impulso (PWM) o di posizione con tensione a vuoto di 4,8 V ±10% su carico minimo di 1KΩ |
| **Uscite digitali:** | **OUT1-5**, 5 SSR 24 Vac 1 A (optoisolate in tre gruppi rispetto G-Go) con corrente minima: 20 mA. Inoltre i 3 gruppi C1/2-OUT1-OUT2, C3/4-OUT3-OUT4, C5-OUT5 sono isolati fra di loro ed il relativo isolamento è di tipo funzionale (tensione < 50 V). GND e G0 sono internamente connessi.<br>**OUT6-C6**, 1 relè 220 Vac, contatto in scambio, contatti protetti da varistori 250 Vac<br>**OUT7-C7**, 1 relè 220 Vac, contatto normalmente aperto, contatti protetti da varistore 250 Vac<br>Corrente max dei relè 2 A (resistiva e induttiva) secondo VDE 0631 per 100.000 commutazioni a 85 °C |
| **Lunghezza max. cavi sonde NTC:** | 50 m |
| **Lunghezza max. cavi ingressi digitali:** | 100 m |
| **Lunghezza max. cavi uscite di potenza:** | 100 m |
| **Lunghezza max. cavi uscita di pilotaggio fan:** | 50 m |
| **Tipo azione dei relè e dei triac:** | 1C (microinterruzione) |
| **Numero massimo delle commutazioni dei relè:** | 100.000 |
| **Isolamento tra i relè e le parti in bassissima tensione:** | rinforzato |
| **Isolamento tra i relè e il frontale:** | rinforzato |
| **Isolamento tra i due relè:** | principale |
| **PTI dei materiali di isolamento:** | 250 V |
| **Categoria di resistenza al calore e al fuoco:** | Categoria D (autoestinguente UL94-V0) |
| **Grado protezione del frontale:** | IP55 |
| **Inquinamento ambientale:** | normale |
| **Periodo di sollecitazione elettrica delle parti isolanti:** | lungo |
| **Classe e struttura del software:** | A |
| **Immunità contro le sovratensioni:** | Categoria II |
| **Interfaccie:** | Pin-strip per scheda seriale Rs485 optoisolata MAC2SER000 (opzionale)<br>Pin-strip per scheda orologio MAC2CLK000 (opzionale)<br>Connettore per chiave di programmazione<br>Connettore per aggiornamento software microprocessore |
| **Installazione:** | A pannello, vedi capitolo Dimensioni. |
| **Modalità di connessione:** | i collegamenti vengono effettuati tramite i quattro connettori posteriori.<br>Per la connessione utilizzare i connettori forniti a corredo o con il codice CAREL MAC2CON001:<br>**Codice Molex® dei connettori femmina** — **Vie**<br>39-01-2080 — 8<br>39-01-2120 — 12<br>39-01-2180 — 18<br>**Codice Molex® del contatto del connettore** — **Sezione dei cavi ammessa**<br>39-00-0077 — AWG16 (1.25 mm²)<br>39-00-0038 (codice CAREL 5931189AXX) — AWG18-24 (0.90 - 0.35 mm²)<br>39-00-0046 — AWG22-28 (0.22 - 0.06 mm²)<br>**Per la crimpatura utilizzare l'apposito attrezzo Molex® 69008-0724** |
| **N. max. di inserzione/disinserzione connettori:** | 25 cicli |

**Tab. 6**

# 10. Technical specifications

| Technical specifications | |
|---|---|
| **Power supply:** | 24Vac ±15% 50/60Hz |
| **Maximum current consumption:** | 200mA with internal 800mA T fuse (slow-blow) |
| **Power transformer for µAC and digital inputs:** | 10VA |
| **Operating range:** | Temperature probes -30to70°C<br>Humidity probe 0to100% r.H. |
| **Accuracy of measurement (excluding probe):** | ±0.5°C NTC probes / ±0.005V 0.5% f.s. 0to1Vdc probe / ±0.02mA 1% f.s. 4to20mA probe |
| **Resolution:** | 0.1°C |
| **Operating conditions:** | -10T54 (-10to54°C) with 20to80% r.H. non-condensing |
| **Storage conditions:** | -10T70 (-10to70°C) with 0to80% r.H. non-condensing |
| **Analogue inputs:** | **B1-B2-B4**, for 3 NTC CAREL temperature probes (10KΩ at 25°C)<br>**B3**, 1 0to1Vdc/4to20mA input for humidity or pressure probe (selected using rear pin strip)<br>+V, Probe power output 14Vdc 30mA max |
| **Digital inputs:** | **ID1-ID10**, 10 inputs not optically isolated from power supply potential G0 powered at 24Vac current consumed by each input 6.5mA at 24Vac. The alarms are active when the corresponding input is open (not powered).<br>Input ID1, for Remote ON/OFF, switches on the machine when powered.<br>Input ID7, for Cooling/heating, enables heating operation when powered. |
| **Analogue outputs:** | **Y1**, 0to10Vdc output not optically isolated from power supply potential G0, maximum load 10mA 1KΩ<br>**Y2**, 1 phase-cut output for CAREL MCHRTF*0A0 regulator, impulsive at mains frequency, configured by user parameters for pulse width modulation (PWM) or position, with loadless voltage of 4.8V ±10% on minimum load of 1KΩ |
| **Digital outputs:** | **OUT1-5**, 5 SSR 24Vac 1A (optically isolated in three groups from G-Go) with minimum current of 20mA. In addition, the 3 groups C1/2-OUT1-OUT2, C3/4-OUT3-OUT4, C5-OUT5 are insulated from each other and this insulation is functional (voltage < 50V). GND and G0 are connected internally.<br>**OUT6-C6**, 1 220Vac relay, switching contact, contacts protected by 250Vac varistors<br>**OUT7-C7**, 1 220Vac relay, normally open contact, contacts protected by 250Vac varistors Max. relay current 2A (resistive and inductive) according to VDE 0631 for 100,000 switchings at 85°C |
| **Max. NTC probe cable length:** | 50m |
| **Max. digital input cable length:** | 100m |
| **Max. power output cable length:** | 100m |
| **Max. fan control output cable length:** | 50m |
| **Type of action of relay and triac:** | 1C (micro-switching) |
| **Maximum number of relay switchings:** | 100,000 |
| **Insulation between the relay and low voltage parts:** | reinforced |
| **Insulation between the relay and the front panel:** | reinforced |
| **Insulation between the two relays:** | primary |
| **PTI of materials used for insulation:** | 250V |
| **Category of resistance to heat and fire:** | Category D (self-extinguishing UL94-V0) |
| **Front panel index of protection:** | IP55 |
| **Environmental pollution:** | normal |
| **Period of electrical stress across insulating parts:** | long |
| **Software class and structure:** | A |
| **Immunity against voltage surges:** | Category II |
| **Interfaces:** | Pin-strip for optically isolated RS485 serial board MAC2SER000 (optional)<br>Pin-strip for clock board MAC2CLK000 (optional) Connector for programming key Connector for updating microprocessor software |
| **Installation:** | Panel mounting, see chapter on Dimensions. |
| **Method of connection:** | Connections are made using the four rear connectors.<br>For the connections use the connectors supplied or CAREL code MAC2CON001:<br>**Molex® code for the female connectors** — **Way**<br>39-01-2080 — 8<br>39-01-2120 — 12<br>39-01-2180 — 18<br>**Molex® code for the connector contact** — **Cross-sec. allowed for cables**<br>39-00-0077 — AWG16 (1.25mm²)<br>39-00-0038 (CAREL code 5931189AXX) — AWG18-24 (0.90 - 0.35mm²)<br>39-00-0046 — AWG22-28 (0.22 - 0.06 mm²)<br>**For crimping use the relative Molex® tool 69008-0724** |
| **Max. no. of connector insertions/removals:** | 25 cycles |

**Tab. 7**

## 11. Codici degli strumenti e accessori

## *11. Instrument and accessory codes*

### 11.1 Tabella codici

| Descrizione | Codice |
|---|---|
| **µAC** | |
| µAC controllore per condizionatore di precisione, completo di connettore femmina | MAC2000A00 |
| **Opzioni** | |
| Scheda seriale RS485 per collegamento a supervisione | MAC2SER000 |
| Scheda orologio con 8 KB eeprom | MAC2CLK000 |
| Chiave di programmazione | MAC2KEY000 |
| Schede di regolazione ventilatori monofase **(*)** 2= 2A - 4= 4A - 6= 6A - 8= 8A | MCHRTF*****0A0 |
| Scheda convertitore PWM 0…10V | CONV0/10A0 |
| Kit connettori femmina per codici personalizzati (imballo da 10 kit) | MAC2CON001 |
| Kit di 24 cavi di lunghezza 1 m | MCHSMLCAB0 |
| **Sonde** | |
| Sonde NTC con cavo singolo isolamento IP67 -50…50 °C - **(**)** 08= 0,8m / 15= 1,5m / 30= 3m / 60= 6m | NTC0**HP00 |
| Sonde NTC con cavo doppio isolamento IP68 -50…100 °C - **(**)** 08= 0,8m / 15= 1,5m / 30= 3m / 60= 6m | NTC0**WP00 |
| Sonda ambiente di temperatura NTC + umidità 10…90 % U.R. | ASWC111000 |
| Sonda ambiente di umidità 10…90 % U.R. | ASWH100000 |
| Sonda condotta di temperatura NTC + umidità 10…90 % U.R. | ASDC111000 |
| Sonda condotta di umidità 10…90 % U.R. | ASDH100000 |
| Sonda condotta di umidità 0…100 % U.R. | ASDH200000 |
| Sonda di pressione 0…30 bar (uscita 4…20mA) con attacco maschio e 2 m di cavo | SPK3000000 |
| Sonda di pressione 0…30 bar (uscita 4…20mA) con attacco femmina e connettore mini-DIN43650 (in imballo multiplo da 10 pz) | SPK6000001 |

**Tab. 8**

### *11.1 Table of codes*

| *Description* | *Code* |
|---|---|
| ***µAC*** | |
| *µAC control for precision air-conditioners, complete with female connector* | *MAC2000A00* |
| ***Options*** | |
| *RS485 serial board for connection to supervisor* | *MAC2SER000* |
| *Clock board with 8 KB EEPROM* | *MAC2CLK000* |
| *Programming key* | *MAC2KEY000* |
| *Single-phase fan speed regulation board (*) 2= 2A - 4= 4A - 6= 6A - 8= 8A* | *MCHRTF*0A0* |
| *PWM 0to10V converter board* | *CONV0/10A0* |
| *Female connector kit for customisable codes (pack of 10 kits)* | *MAC2CON001* |
| *Kit of 24 x 1m cables* | *MCHSMLCAB0* |
| ***Probes*** | |
| *NTC probes with single cable insulation IP67 -50to50°C - (**) 08= 0.8m / 15= 1.5m / 30= 3m / 60= 6m* | *NTC0**HP00* |
| *NTC probes with double cable insulation IP68 -50to100°C - (**) 08= 0.8m / 15= 1.5m / 30= 3m / 60= 6m* | *NTC0**WP00* |
| *NTC ambient temperature + humidity probe 10to90 % R.H.* | *ASWC111000* |
| *Ambient humidity probe 10to90 % R.H.* | *ASWH100000* |
| *NTC duct temperature probe + humidity 10to90 % R.H.* | *ASDC111000* |
| *Duct humidity probe 10to90 % R.H.* | *ASDH100000* |
| *Duct humidity probe 0to100 % R.H.* | *ASDH200000* |
| *Pressure probe 0to30 bar (output 4to20mA) with male connector and 2m cable* | *SPK3000000* |
| *Pressure probe 0to30 bar (output 4to20mA) with female connector and mini-DIN43650 connector (multiple pack of 10 pcs.)* | *SPK6000001* |

**Tab. 9**

## 12. Dimensioni

Di seguito vengono indicate le dimensioni meccaniche di ciascun componente del controllore µAC; tutti i valori sono espressi in millimetri.

**Controllore µAC / *µAC control***

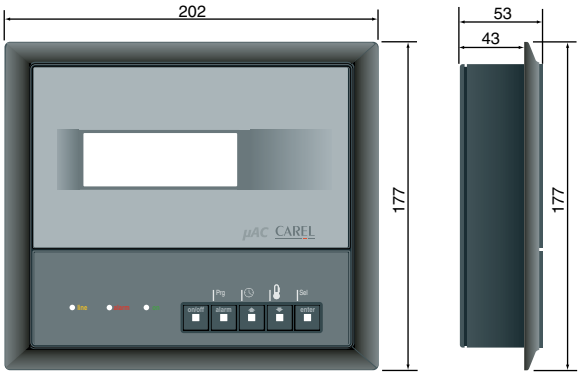



**Fig. 39**

**Dime di foratura / *Drilling template***

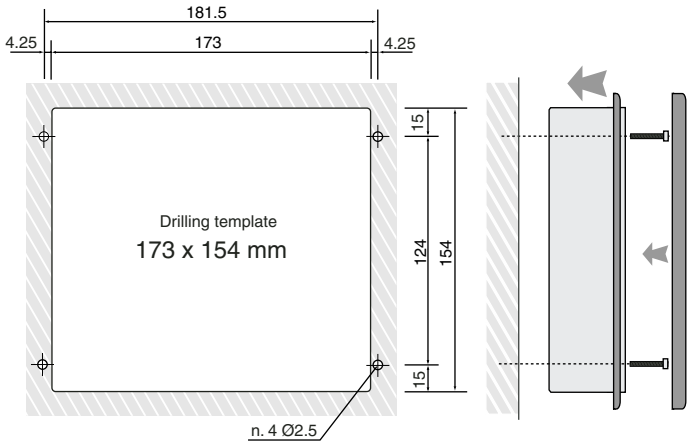
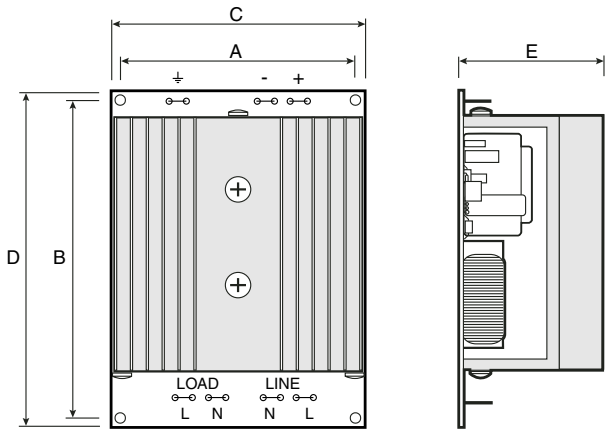



**Fig. 40**

**Moduli regolazione ventilatori / *Fan regulation modules***




| Cod. | A | B | C | D | E |
|---|---|---|---|---|---|
| MCHRTF20A0 | 43 | 100 | 50 | 107 | 32 |
| MCHRTF40A0 | 43 | 100 | 50 | 107 | 46 |
| MCHRTF60A0 | 75 | 100 | 82 | 107 | 46 |
| MCHRTF80A0 | 75 | 100 | 82 | 107 | 64 |

**Fig. 43**

## *12. Dimensions*

*Following are the mechanical dimensions of each of the components of the µAC control; all values are in millimetres.*

**Chiave hardware MAC2KEY000 / *Hardware key MAC2KEY000***

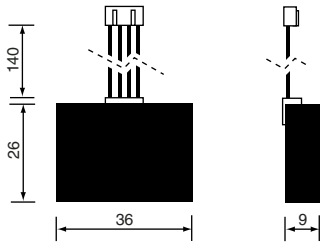



**Fig. 42**

**CONV0/10A0 / CONV0/10A0**

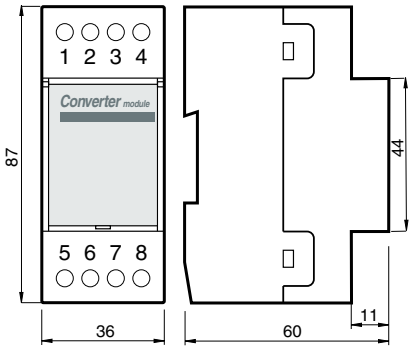



**Fig. 41**

## 13. Aggiornamento software

### 13.1 Note per la versione 1.3

La release software 1.3 rispetto alla precedente 1.2 presenta le seguenti funzionalità:

- aggiunta la gestione allarme fumo-fuoco nell'ingresso ID4 selezionabile con il parametro PE;
- aggiunta la gestione allarme flusso acqua nell'ingresso ID9 nelle macchine CW, selezionabile con il parametro PF;
- aggiunta la gestione preallarme alta temperatura selezionabile con il parametro PG;
- aggiunto la gestione di 2 ventilatori di mandata con le selezioni 6, 7 sul parametro HA;
- attivato il limite di bassa temperatura di mandata in tutte le configurazioni;
- modificato il tempo di reset delle valvole a 3-punti da H7/6 a H7/2 per facilitare la gestione di valvole con tempi di corsa diversi;
- aggiunta la gestione di deumidifica nella configurazione per "shelter", e modificata la gestione nelle altre configurazioni (set point di temperatura dinamico in deumidificazione, che elimina la zona neutra);
- modificata nella configurazione "shelter" la gestione degli allarmi del compressore e mancanza rete, che abilitano l'apertura della serranda indipendentemente dalla temperatura esterna;
- in tutte le configurazioni l'attivazione degli attuatori dalla partenza del ventilatore, avviene dopo il tempo P1 per permettere la lettura di un'eventuale allarme di flusso.

**Programmazione con chiave hardware:**

- con la chiave programmata con release 1.2 quando si programma la versione 1.3 del µAC, i parametri che prima non esistevano, assumono il valore di default.

## *13. Software updating*

### *13.1 Notes for the 1.3 version*

*The 1.3 software release, in comparison with the previous one 1.2, has the following new functions:*

- *the addition of the smoke-fire alarm management in the ID4 input that can be selected using the PE parameter;*
- *the addition of the water flow alarm in the ID9 input in the CW machines that can be selected with the PF parameter;*
- *the addition of the high temperature prealarm management that can be selected with the PG parameter;*
- *the addition of the management of 2 supply fans using the selections 6, 7 on the HA parameter;*
- *the activation of the supply low temperature limit in all the configurations;*
- *the modification of the reset time of the 3-point valves from H7/6 to H7/2 to allow the management of fans with different running times;*
- *the addition of the dehumidification management in the "shelter" configuration, and the modification of the management in the other configurations (dynamic temperature setpoint during dehumidification that removes the neutral zone);*
- *the modification of the management of the compressor alarms and no power alarm in the "shelter" configuration that enable the opening of the damper independently of the external temperature;*
- *in all the configurations the activation of the actuators from the fan startup occurs after the P1 time to allow the reading of a possible flow alarm.*

***Hardware key programming:***

- *with the key programmed with release 1.2 when the 1.3 µAC version is being programmed, the parameters, which didn't exist before, take the default value*

## 14. Errata Corrige

Corretto il collegamento della "valvola caldo" (vedi disegno Fig. 7).

## *14. Errata Corrige*

*Correction of the connection of the "heating valve" (see Fig. 7).*

CAREL si riserva la possibilità di apportare modifiche o cambiamenti ai propri prodotti senza alcun preavviso.

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***note:***

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# 19.- HOJA DE DATOS

## 6. Descrizione e configurazione dei parametri

## 6. Description and configuration of the parameters

| / / | Sonde / *Probes* | HL= | Tipo/Type 0 | 1 | 2 | 3 | Min *Min* | Max *Max* | U.M. *U. o. M.* | Var. *Var.* | Def *Def* | Pres. *Pres.* | Nuovo *New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Presenza sonda aria esterna B2/*Presence external air probe B2*<br>0= assente/*absent*<br>1= NTC CAREL/*TC CAREL* | | F | F | U | U | 0 | 1 | flag | 1 | 0 | | |
| 2 | Tipo di sonda umidità/press./temp. B3/*Type of humidity/press./temp. probe B3*<br>0= assente / *absent*<br>1= 0-1Vdc o 0-20mA / *0-1Vdc or 0-20mA*<br>2= 4-20 mA / *4-20mA* | | F | F | F | F | 0 | 2 | flags | 1 | 1 | | |
| 3 | Presenza aria mandata B4 / *Presence supply air B4*<br>0= assente / *absent*<br>1= NTC CAREL (abilita allarme relativo) / *NTC CAREL (enable corresp. alarm)* | | F | F | F | F | 0 | 1 | flag | 1 | 0 | | |
| 4 | Valore umidità/pressione a 0 mA, 4mA o 0Vdc<br>*Value of humidity/pressure at 0mA, 4mA or 0Vdc* | | F | F | F | F | 0 | /5 | %rH<br>bar | 0.1 | 0 | /2≠0 | |
| 5 | Valore umidità/pressione a 20mA o 1Vdc<br>*Value of humidity/pressure at 20mA or 1Vdc* | | F | F | F | F | /4 | 100 | %rH<br>bar | 0.1 | 100 | /2≠0 | |
| 6 | Calibrazione sonda B1<br>*Calibration probe B1* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | | |
| 7 | Calibrazione sonda B2<br>*Calibration probe B2* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | /1≠0 | |
| 8 | Calibrazione sonda B3 / *Calibration probe B3* | | U | F | U | U | -10.0 | 10.0 | %rH/bar | 0.1 | 0.0 | /2≠0 | |
| 9 | Calibrazione sonda B4<br>*Calibration probe B4* | | U | F | U | U | -6.0<br>-10.8 | 6.0<br>10.8 | °C<br>°F | 0.1 | 0.0 | /3≠0 | |
| A | Filtro digitale / *Digital filter* | | U | F | U | U | 1 | 15 | - | 1 | 4 | | |
| b | Limitazione ingresso / *Input limit* | | U | F | U | U | 1 | 15 | - | 1 | 8 | | |
| c | Unità di misura (0=°C,1=°F) / *Unit of measure (0=°C,1=°F)* | | U | U | U | U | 0 | 1 | flag | 1 | 0 | | |

| r r | Regolatore / *Probes* | HL= | Tipo/Type 0 | 1 | 2 | 3 | Min *Min* | Max *Max* | U.M. *U. o. M.* | Var. *Var.* | Def *Def* | Pres. *Pres.* | Nuovo *New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Set Point temperatura (estate) / *Temperature Set Point (cooling)* | | D | D | D | D | rA | rb | °C/°F | 0.1 | 3 1 . 0 | | |
| 2 | Differenziale raffreddamento<br>*Cooling differential* | | D | D | D | D | 0.1<br>0.1 | 11.0<br>19.8 | °C<br>°F | 0.1 | 3.0 | | |
| 3 | Differenziale riscaldamento<br>*Heating differential* | | D | D | D | D | 0.1<br>0.1 | 11.0<br>19.8 | °C<br>°F | 0.1 | 2.0 | | |
| 4 | Zona neutra per la temperatura<br>*Temperature dead zone* | | D | D | D | D | 0.1<br>0.1 | 20.0<br>36.0 | °C<br>°F | 0.1 | 1.0 | | |
| 5 | Set Point umidità / *Humidity Set Point* | | D | D | D | D | rc | rd | %rH | 1 | 40 | /2≠0 | |
| 6 | Differenziale umidificazione / *Humidification differential* | | D | D | D | D | 1 | 20 | %rH | 1 | 1 0 | /2≠0 | |
| 7 | Differenziale deumidificazione / *Dehumidification differential* | | D | D | D | D | 1 | 20 | %rH | 1 | 1 0 | /2≠0 | |
| 8 | Zona neutra per l'umidità / *Humidity dead zone* | | D | D | D | D | 0 | 20 | %rH | 1 | 2 | /2≠0 | |
| 9 | Set Point temperatura (inverno) / *Temperature Set Point (heating)* | | D | D | D | D | rA | rb | °C/°F | 0.1 | 18.0 | | |
| A | Set minimo temperatura (anche per compensazione)<br>*Minimum temperature set point (also for compensation)* | | U | F | U | U | -20<br>-4 | rb | °C<br>°F | 0.1 | 0 | | |
| b | Set massimo temperatura (anche per compensazione)<br>*Maximum temperature set point (also for compensation)* | | U | F | U | U | rA | 60<br>140 | °C<br>°F | 0.1 | 50 | | |
| c | Set minimo umidità / *Minimum humidity set point* | | U | F | U | U | 0 | rd | %rH | 1 | 0 | /2≠0 | |
| d | Set massimo umidità / *Maximum humidity set point* | | U | F | U | U | rc | 100 | %rH | 1 | 100 | /2≠0 | |
| E | Tipo di regolazione temperatura / *Type of temperature regulation*<br>0= P, 1= P+I | | U | F | U | U | 0 | 1 | flag | 1 | 0 | | |
| F | Tempo integrazione per azione PI / *Integration time for PI action* | | U | F | U | U | 10 | 3600 | s | 1 | 600 | rE≠0 | |
| G | Autorità (unica per Estate/inverno) vale per la compensazione<br>*Authority (unique for Cooling/heating) for compensation* | | U | F | U | U | -2.0 | 2.0 | | 0.1 | 0.5 | /1≠0 | |
| H | Set Point di compensazione sulla temp. letta da B2 (estate)<br>*Set Point compensation on temp. read by B2 (cooling)* | | U | F | U | U | -20<br>-4 | 60<br>140 | °C<br>°F | 0.1 | 25.0 | /1≠0 | |
| i | Set Point di compensazione sulla temp. letta da B2 (inverno)<br>*Set Point compensation on temp. read by B2 (heating)* | | U | F | U | U | -20<br>-4 | 60<br>140 | °C<br>°F | 0.1 | 10.0 | /1≠0 | |
| L | Differenziale free cooling<br>*Free cooling differential* | | U | F | U | U | 0<br>0 | 30<br>54 | °C<br>°F | 1 | 9 | /1≠0 | |
| n | Limite inferiore temperatura mandata<br>*Supply temperature lower limit* | | U | F | U | U | -20<br>-4 | 30<br>86 | °C<br>°F | 1 | 5 | /1≠0 | |
| o | Lettura sonda B2 / *Reading from probe B2* | | D | D | D | D | | | °C/°F | | | /1≠0 | |
| P | Lettura sonda B3 / *Reading from probe B3* | | D | D | D | D | | | %rH/bar | | | /2≠0 | |
| r | Lettura sonda B4 / *Reading from probe B4* | | D | D | D | D | | | °C/°F | | | /3≠0 | |
| t | Impostazione fasce orarie / *Time band setting*<br>0= disabilitate / *disabled*<br>1= vent. al min. con monitoriz. della temp./*fan on min. with temp. monitoring*<br>2= On/off / *ON/OFF* | | U | U | D | D | 0 | 2 | flags | 1 | 0 | | |

| c<br>c | Compressore<br>*Compressor* | HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Tempo minimo di On / *Minimum ON time* | | U | F | F | F | 0 | 300 | s | 1 | 60 | | |
| 2 | Tempo minimo di Off / *Minimum OFF time* | | U | F | F | F | 0 | 900 | s | 1 | 180 | | |
| 3 | Tempo tra 2 accensioni / *Time between 2 start-ups* | | U | F | F | F | 0 | 900 | s | 1 | 180 | | |
| 4 | Ritardo accensione tra i 2 compressori<br>*ON delay between the 2 compressors* | | U | F | F | F | 0 | 300 | s | 1 | 30 | | |
| 5 | Ritardo spegnimento tra i 2 compressori<br>*OFF delay between the 2 compressors* | | U | F | F | F | 0 | 300 | s | 1 | 0 | | |
| 6 | Rotazione compressori / *Compressor rotation*<br>0= disabilitata / *disabled*<br>1= abilitata / *enabled* | | F | F | F | F | 0 | 1 | flag | 1 | 0 | | |
| 7 | Ritardo accensione comp. dalla partenza ventilatore mandata<br>*Delay comp. ON from supply fan start-up* | | U | F | U | F | 0 | 300 | s | 1 | 20 | | |
| 8 | Soglia contaore per il compressore<br>*Hour counter threshold for the compressor*<br>0= disabilitato / *disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| 9 | Contaore compressore 1 / *Hour counter compressor 1* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |
| A | Contaore compressore 2 / *Hour counter compressor 2* | | D | U | D | U | 0 | 30000 | h | - | 0 | | |

| F<br>F | Ventilatori<br>*Fans* | HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Modalità funzionamento ventola / *Fan operating mode*<br>0= sempre On /*always ON*<br>1= regolazione velocità in proporzionale. Se utilizzato in condensazione mantiene il ventilatore al minimo anche sotto il valore espresso da F5<br>*1= proportional speed regulation. If used in condensation the fan is kept at minimum even below the value of F5*<br>2= regolazione velocità in proporzionale. Se utilizzato in condensazione spegne il ventilatore sotto il valore espresso da F5 con un isteresi pari a 0.5 bar se in pressione o di 1 °C se in temperatura<br>2= *proportional speed regulation. If used in condensation the fan is switched off below the value of F5, with an hysteresis of 0.5 bar for pressure or 1°C for temperature* | | F | F | F | F | 0 | 2 | flags | 1 | 0 | | |
| 2 | Soglia tensione minima per Triac / *Minimum Triac voltage threshold* | | F | F | F | F | 0 | F4 | step | 1 | 35 | | |
| 3 | Soglia tensione massima per Triac / *Maximum Triac voltage threshold* | | F | F | F | F | F3 | 100 | step | 1 | 75 | | |
| 4 | Durata impulso triac / *Triac pulse width* | | F | F | F | F | 0 | 15 | ms | 1 | 2 | | |
| 5 | % banda regolazione per minima velocità o temperatura/pressione minima velocità in condensazione<br>*% regulation band for minimum speed or temperature/pressure for minimum speed in condensation* | | U | F | U | F | 0<br>0<br>/4 | F6 | %<br>°C/°F<br>bar | 0.1 | 20 | | |
| 6 | % banda regolazione per massima velocità o temperatura/pressione massima velocità in condensazione<br>*% regulation band for maximum speed or temperature/pressure for maximum speed in condensation* | | U | F | U | F | F5 | 100<br>158<br>/5 | %<br>°C/°F<br>bar | 0.1 | 100 | | |
| 7 | Valore di minima uscita / *Minimum output value* | | U | F | U | F | 0 | F8 | % | 1 | 10 | | |
| 8 | Valore di massima uscita / *Maximum output value* | | U | F | U | F | F7 | 100 | % | 1 | 100 | | |
| 9 | Soglia contaore per il ventilatore / *Fan hour counter threshold*<br>0= disabilitato/*disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| A | Contaore ventilatore mandata / *Supply fan hour counter* | | D | U | D | U | 0 | 30000 | h | - | 1 | | |
| b | Soglia contaore per il filtro / *Filter hour counter threshold*<br>0= disabilitato/*disabled* | | U | U | U | U | 0 | 30000 | h | 1 | 0 | | |
| c | Contaore filtro / *Filter hour counter* | | D | U | D | U | 0 | 30000 | h | - | 1 | | |
| d | Ritardo spegnimento ventilatore mandata / *Supply fan OFF delay* | | U | F | U | F | 0 | 900 | s | 1 | 20 | | |
| E | Tempo di spunto ventole in condensazione<br>*Fan pick-up time in condensation* | | U | F | F | F | 0 | 60 | s | 1 | 4 | | |

| P<br>P | Allarme<br>*Alarm* HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Ritardo allarme di flusso dalla partenza ventilatore<br>*Flow alarm delay from fan start-up* | U | F | F | F | 0 | 250 | s | 10 | 20 | | |
| 2 | Ritardo allarme di flusso durante il funzionamento<br>*Flow alarm delay during operation* | U | F | F | F | 0 | 90 | s | 1 | 5 | | |
| 3 | Ritardo allarme bassa pressione dalla partenza compressore<br>*Low pressure alarm delay from compressor ON* | U | F | F | F | 0 | 250 | s | 1 | 30 | | |
| 4 | Attivazione del buzzer / *Buzzer activation*<br>0= OFF, 1-14= min. 15= continuo/*continuous* | U | U | U | U | 0 | 15 | min | 1 | 1 | | |
| 5 | Reset allarmi (varie configurazioni)/*Reset alarms (various configurations)* | F | F | F | F | 1 | 5 | flag | 1 | 1 | | |
| 6 | Delta dal set effettivo per allarme bassa temperatura<br>*Delta from effective set point for low temperature alarm* | U | F | U | U | 0 | 50<br>90 | °C<br>°F | 1 | 10 | | |
| 7 | Delta dal set effettivo per allarme alta temperatura<br>*Delta from effective set point for high temperature alarm* | U | F | U | U | 0 | 50<br>90 | °C<br>°F | 1 | 10 | | |
| 8 | Delta dal set per allarme bassa umidità<br>*Delta from set point for low humidity alarm* | U | F | U | U | 0 | 50 | %rH | 1 | 40 | /2≠0 | |
| 9 | Delta dal set per allarme alta umidità<br>*Delta from set point for high humidity alarm* | U | F | U | U | 0 | 50 | %rH | 1 | 40 | /2≠0 | |
| A | Ritardo allarme alta/bassa temperatura/umidità all'accensione<br>*Alarm delay high/low temperature/humidity on start-up* | U | U | U | U | 0 | 150 | min | 1 | 20 | | |
| b | Tipo gestione ingresso allarme generico ID5<br>*Type of management of generic alarm input ID5*<br>0= nessun allarme collegato / *no alarm connected*<br>1= allarme di sola segnalazione - reset automatico<br>*1= signal only alarm - automatic reset*<br>2= allarme di sola segnalazione - reset manuale<br>*2= signal only alarm - manual reset*<br>3= allarme grave - reset automatico /*serious alarm - automatic reset*<br>4= allarme grave - reset manuale / *serious alarm - manual reset*<br>5= allarme grave - reset automatico attivo anche in stand-by<br>*5= serious alarm - automatic reset also active in stand-by*<br>6= allarme grave - reset manuale attivo anche in stand-by<br>*6= serious alarm - manual reset also active in stand-by* | U | F | U | F | 0 | 6 | flag | 1 | 1 | | |
| c | Ritardo allarme generico / *Generic alarm delay* | U | U | U | F | 0 | 250 | s | 1 | 3 1 | Pb≠0 | |
| d | Differenza temp. ritorno-mandata per allarme temp. mandata<br>*Return-supply temp. difference for supply temp. alarm* | U | F | F | F | 0 | 20<br>36 | °C<br>°F | 0.1 | 3 | /3≠0 | |
| E | Selezione ingresso ID4 / *Input ID4 selection* | U | F | U | F | 0 | 1 | flag | 1 | 1 | | |
| F | Selezione ingresso ID9 / *Input ID9 selection* | U | F | F | F | 0 | 1 | flag | 1 | 1 | | |
| G | Abilitazione preallarme di alta temp. / *High temper. prealarm enabling* | U | F | U | U | 0 | 1 | flag | 1 | 0 | | |

| H<br>H | Generali<br>*General* HL= | Tipo/Type<br>0 | 1 | 2 | 3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Modello di macchina / *Machine model*<br>0= unita' ED / *ED unit*<br>1= unità CW / *CW unit*<br>2= unità CW (E/I) / *CW unit (H/C)*<br>3= shelter / *shelter* | F | F | F | F | 0 | 3 | flags | 1 | 0 | | |
| 2 | N. di macchine in rotazione / *No. of machines in rotation*<br>0= macchina stand-alone / *stand-alone machine*<br>2= 2 unità/*units*.....6= 6 unità/*units* | U | U | U | U | 0 | 6 | flags | 1 | 0 | | |
| 3 | Indirizzo per unità in rotazione / *Address of unit in rotation* | U | U | U | U | 1 | 6 | - | 1 | 1 | H2≠0 | |
| 4 | Tempo di rotazione tra più unità / *Rotation time between a series of units*<br>0= modalità test t=2 min. / *0= test mode t=2 min.* | U | U | U | U | 0 | 250 | h | 1 | 0 | H2≠0 | |
| 5 | Modalità di funzionamento delle 2 uscite "freddo" Out1/Out2<br>*Operating mode of the 2 "cool" outputs*<br>1= 1 compressore / *1 compressor*<br>2= 2 compressori su 2 circuiti / *compressors on 2 circuits*<br>3= valvola a tre punti / *three-point valve*<br>4= 2 compressori in parallelo binario / *2 compressors in binary parallel*<br>5= 2 compr. in tandem (50+50%) / *2 compr.s in tandem (50+50%)* | F | F | F | F | 1 | 5 | flags | 1 | 1 | | |
| 6 | Modalità di funzionamento delle 2 uscite "caldo" Out3/Out4<br>*Operating mode of the 2 "heat" outputs*<br>0= nessun elemento riscaldante / *no heating element*<br>1= 1 resistenza / *1 heating element*<br>2= 2 resistenze / *2 heating elements*<br>3= valvola a tre punti / *three-point valve*<br>4= 2 resistenze in binario / *2 heating elements in binary* | F | F | F | F | 0 | 4 | flags | 1 | 2 | | |

| H<br>H | Generali<br>*General* HL= | Tipo/Type<br>0 | <br>1 | <br>2 | <br>3 | Min<br>*Min* | Max<br>*Max* | U.M.<br>*U. o. M.* | Var.<br>*Var.* | Def<br>*Def* | Pres.<br>*Pres.* | Nuovo<br>*New* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Tempo di escursione valvola 3P o serranda<br>*3P valve or damper excursion time* | F | F | F | F | 0 | 600 | s | 1 | 150 | | |
| 8 | Presenza umidificatore / *Presence of humidifier* | F | F | F | F | 0 | 1 | flag | 1 | 1 | /2≠0 | |
| 9 | Tipo di deumidificazione / *Type of dehumidification*<br>0= accensione comp. 1 / *comp. 1 ON*<br>1= accensione comp. 2 / *comp. 2 ON*<br>2= accensione due comp. / *two comp. ON*<br>3= parzializzazione rampa fredda / *capacity-controlled cooling ramp*<br>4= riduzione velocità vent. / *fan speed reduction*<br>5= azione 4+0 / *action 4+0*<br>6= azione 4+1 / *action 4+1*<br>7= azione 4+2 / *action 4+2*<br>8= azione 4+3 / *action 4+3*<br>9= nessuna azione / *no action* | F | F | F | F | 0 | 9 | flags | 1 | 0 | /2≠0 | |
| A | Funzione del relè di deumidificazione/umidificazione<br>*Function of the dehumidification/humidification relay*<br>0= eccitato in deumidificazione / *energised in dehumidification*<br>1= diseccitato in deumidificazione / *de-energised in dehumidification*<br>2= relè per allarmi non gravi (segue logica parametro HF)<br>2= *relay for non-serious alarms (follows logic of parameter HF)*<br>3= uscita per controllo rotazione / *output for rotation control*<br>4= eccitato in umidificazione / *energised in humidification*<br>5= diseccitato in umidificazione / *de-energised in humidification*<br>6= selezione a 2 vent., acceso in deum. / *2 fan selection on during deum.*<br>7= selezione a 2 vent., spento in deum. / *2 fan selection off during deum.* | F | F | F | F | 0 | 7 | flags | 1 | 1 | | |
| b | Funzione uscita Y2 (taglio di fase) / *Function of output Y2 (phase-cut)*<br>0= controllo velocità ventilatore mandata / *supply fan speed control*<br>1= controllo velocità ventilatore condensazione tramite B3<br>*1= condensation fan speed control using B3*<br>2= controllo velocità ventilatore condensazione tramite B2<br>*2= condensation fan speed control using B2* | F | F | F | F | 0 | 2 | flags | 1 | 0 | | |
| c | Funzione della sonda B2 / *Function of probe B2*<br>0= compensazione / *compensation*<br>1= free-cooling tramite 0-10V / *free-cooling using 0-10V*<br>2= free-cooling tramite Out3-Out4 / *free-cooling using Out3-Out4*<br>3= free-cooling On/Off con Out3 / *free-cooling ON/OFF with Out3*<br>4= controllo condensazione / *condensation control* | F | F | F | F | 0 | 3 | flag | 1 | 0 | /1≠0 | |
| d | Funzione della sonda B3 / *Function of probe B3*<br>0= controllo umidità / *humidity control*<br>1= controllo condensazione / *condensation control* | F | F | F | F | 0 | 1 | flag | 1 | 0 | /2≠0 | |
| E | Ingresso digitale ON/OFF / *ON/OFF digital input*<br>0= assente / *absent*<br>1= presente / *present* | U | U | U | U | 0 | 1 | flag | 1 | 1 | | |
| F | Logica del relè di allarme / *Alarm relay logic*<br>0= diseccitato in allarme per tutti gli allarmi<br>*0= de-energised in alarm for all alarms*<br>1= eccitato in allarme per tutti gli allarmi / *energised in alarm for all alarms*<br>2= diseccitato in allarme solo per gli allarmi gravi<br>*2= de-energised in alarm only for serious alarms*<br>3= eccitato in allarme solo per gli allarmi gravi<br>*3= energised in alarm only for serious alarms* | U | U | U | F | 0 | 3 | flags | 1 | 1 | | |
| G | Ritardo all'accensione / *Delay on start-up* | U | U | U | U | 0 | 300 | s | 1 | 5 | | |
| H | Password USER / *USER password* | U | U | U | U | 0 | 200 | - | 1 | 22 | | |
| i | Blocca modifiche parametri (viene visualizzato dal lucchetto)<br>*Block parameter modifications (displayed by lock)*<br>0= no blocco / *no block* | U | U | U | U | 0 | 1 | flag | 1 | 0 | | |
| L | Set di parametri / *Parameter sets* | F | F | F | F | 0 | 3 | flags | 1 | 0 | | |
| n | Selezione visualizzazione sul display / *Select data shown on display*<br>0= sonde B1, B3 (se presente) / *probes B1, B3 (if present)*<br>1= set-point di temp. e umid. (se presente)<br>*1= temperature. and humid. set-point (if present)*<br>2= giorno ed ora (se presente l'orologio)<br>*2= day and time (if clock present)* | U | F | U | F | 0 | 2 | flags | 1 | 0 | | |
| o | Indirizzo seriale rete supervisione / *Supervisor network serial address* | U | U | U | U | 1 | 200 | - | 1 | 1 | | |
| P | Baudrate seriale supervisore / *Supervisor serial baudrate*<br>1= 1200, 2= 2400, 3= 4800, 4= 9600, 5=19200 Baud | U | U | U | U | 1 | 5 | flags | 1 | 5 | | |
| r | Versione software / *Software version* | D | D | D | D | | | | | 1.7 | | |

**Tab. 2**

# CONFORTFRESH

La empresa abarca una gran variedad de productos que proporcionan soluciones en sistemas de refrigeración de uso residencial y comercial. Nuestros procesos son guiados por filosofía de mejoramiento continuo que permite ofrecer un servicio integral y soluciones óptimas para el mercado global; garantizando disponibilidad en la entrega y aplicando día a día la más avanzada tecnología.

Situamos estratégicamente en la ciudad de Miami, florida y con plantas de producción en Colombia y Asia, buscamos ser líderes en el suministro de sistemas de acondicionamiento de aires; agregando valor y garantizando la lealtad de nuestros clientes, mediante soluciones que contienen la mejor tecnología, conocimiento, compromiso y profesionalismo, ofreciendo siempre equipos de excelente calidad, a precios competitivos y con el soporte técnico adecuado.

Para nosotros es sumamente importante resolver todas sus dudas, y hacerlo sentir la mejor experiencia con nuestros equipos y personal. ¿Deseas recibir información sobre nuestro portafolio de productos y servicios? Encuentre aquí varias maneras de contactarnos cualquiera sea tu necesidad; estamos a su entera disposición. Por favor complete los datos del formulario y pronto nos comunicaremos con usted.

## DATOS DE CONTACTO

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